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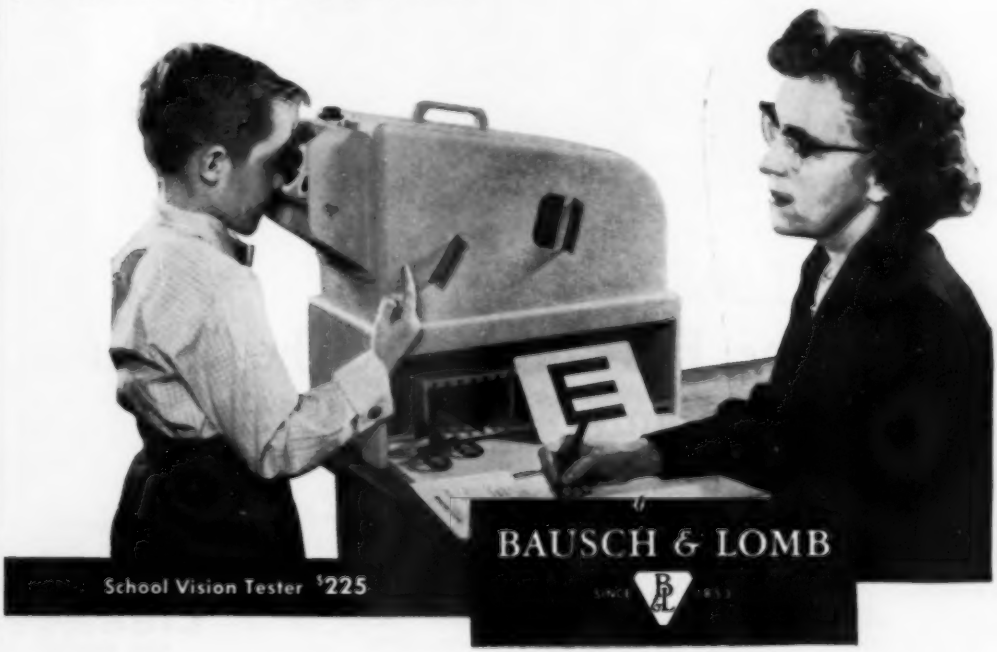

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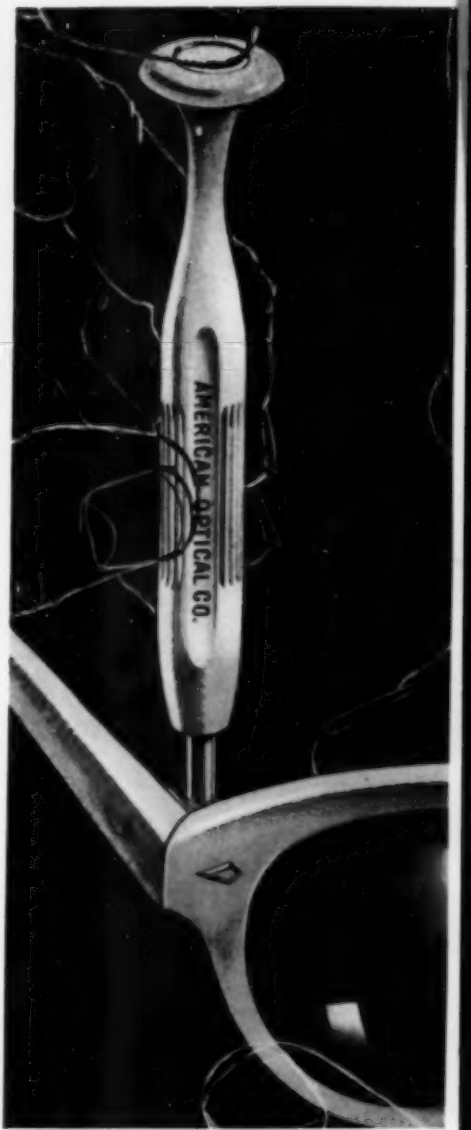
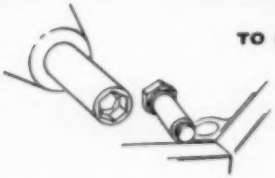
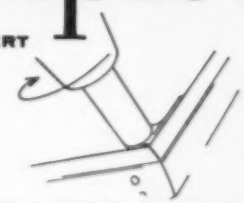


TO INSERT

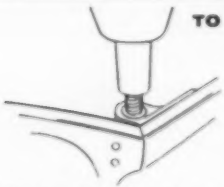


(1) Place the Red Dot screw in the end of the hex wrench.

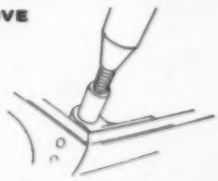


(2) Insert in hinge and turn to desired tension.

TO REMOVE



(1) Unscrew the Red Dot screw with hex wrench.



(2) Insert extractor and remove nylon bushing.

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SOME EFFECTS OF PREGNANCY ON THE EYE*

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Camp Wolters, Texas

This investigation is a longitudinal study of 51 consecutive obstetrical out-patients who presented themselves for pre-natal care at the Obstetrics and Gynecology Clinic of the U. S. Army Hospital, Aberdeen Proving Grounds, Maryland. These patients were Army wives and represented an unselected cross section of race, geographic origin, age, and previous pregnancies. The mean age was 24.7 years, with a standard deviation of 5.3 years. Thirty of the subjects became primiparas and 21 became multiparas.

For some time it has been known that the eye may undergo certain pathological changes during toxemia of pregnancy.[1] These affections were specifically excluded from the scope of this study, and the one subject showing preeclamptic signs was not included.

Each subject was seen monthly for five or more months, and the following functions were measured: (1) ametropia, (2) lateral heterophoria at 6 meters, (3) lateral heterophoria at 40 centimeters (i.e., fusional supplementary convergence), (4) amplitude of accommodation, and (5) monocular visual acuity.

EXPERIMENTAL METHODS AND CRITERIA

Ametropia: The ametropia was measured in one meridian by skiametry, using the American Optical Company Fulvue retinoscope. The horizontal meridian was selected except in one case, the only case that exhibited an oblique shadow during skiametry, where the meridian of the minus cylinder axis was measured.

The retinoscope is not an exact instrument, and therefore any interpretation of retinoscopic data must consider the limitations of the instrument. Hirsch[2] reported the standard deviation of the difference between two retinoscopic measurements to be about 0.34 D. for 984 eyes. The conclusion was reached that "a difference of 0.75 D. will

*Submitted on October 22, 1957, for publication in the March, 1958, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.
†Military Optometrist, 1/Lt., M.S.C.

be required before one can think of postulating that the procedure and the change were associated." The "procedure" in the present study would be pregnancy. This conclusion was adopted as a working rule in the analysis of the retinoscopic data of this series.

An effort was made to eliminate bias of the refractionist toward former measurements by recording each month's skiametric finding without reference to the previous record. The refractionist found it quite impossible to remember what the previous month's finding had been. For these reasons it is felt that "bias" referred to by Hirsch was not a factor in this survey.

Heterophoria: The Von Graefe technique was utilized to measure the lateral heterophoria at 6 meters and at 40 centimeters. A vertical dissociating prism of six prism diopters was placed before one eye and the measuring Risley prism was placed before the other eye.

This technique is a subjective method and is susceptible to certain inaccuracies. The accuracy of any single response is affected by the subject's attentiveness, speed of verbal response, and vernier visual acuity. The subjects were, of course, untrained observers. An effort to minimize error was made by taking three measurements and recording the average of the last two, which were from opposite sides. Since the measurements were made with a Green's refractor the error inherent in any refractor was present—i.e., the "tube effect." It was assumed, however, that if the use of a refractor did indeed introduce an error that it would be a constant error, and thus would not be a factor in analyzing the month to month variation.

Morgan[3] has studied the reliability of heterophoria measurements on 88 subjects, and concluded that "the error of measurement of distance heterophoria approximates 1.5Δ." This figure was adopted in analyzing the heterophoria data in the present study.

Amplitude of Accommodation: The amplitude of accommodation was measured with the American Optical Company Prince rule, which is a ruler marked in dioptic units and equipped with a slide holding a card printed with small test types. The "push up" technique of Donders[4] was employed and the point of first perceptible blur was taken to be the nearpoint of accommodation. Actually this measurement includes the depth of focus as well as the accommodation of the crystalline lens.[5]

In order to estimate the error of measurement of this technique, i.e., the Prince rule with untrained observers, a preliminary study with twelve subjects was carried out. The amplitude of accommodation was measured six times within one hour. Because all determinations were

made within one hour any difference may be considered to be error of measurement.

Table 1 shows the results of this preliminary study, and it is

TABLE I.

Subject	Range	Mean Amplitude	Standard Deviation (S.D.)
MRL	0.5 D	7.9 D	0.19 D
JWE	1.2	9.5	0.44
WD	2.8	10.8	0.78
RLT	1.2	8.4	0.43
WLR	1.4	8.1	0.40
JVA	1.8	9.5	0.66
DPP	2.2	11.8	0.64
JLM	1.9	10.4	1.08
ORB	0.6	7.2	0.22
RKM	2.0	8.4	0.61
EFB	2.9	12.2	1.37
JBB	0.6	8.3	0.63

Mean Range = 1.6 D.
Mean S.D. = 0.63 D.

Table 1 Amplitude of Accommodation as measured six times in one hour with Prince rule.

noted that the average range was 1.6 D., and the mean standard deviation was 0.63 D. The 99% confidence limits for the mean standard deviation was calculated to be 0.63 ± 0.47, or 0.16 to 1.10 D. From this preliminary study the following approximate rule was formulated. The month to month change in accommodative amplitude, as measured with the Prince rule, must exceed 1.50 D. before the change can be attributed to any cause other than error of measurement. This rule applies only to the conditions of the present work which includes that fact that all the subjects, except three, showed an amplitude in excess of 7.0 D.

ACA Ratio: The ACA ratio may be understood by a review of the nature of convergence. Since the time of Maddox[6] convergence has been known to be componential in nature. Maddox referred to the three principle components as: (1) tonic convergence, (2) accommodative convergence, and (3) fusional convergence, and later recognized a fourth component due to the "knowledge of nearness" which has come to be known as (4) proximal or psychic convergence. The second component was so named because it appears to be linked with accommodation, and for each diopter of accommodation there is a constant amount of convergence, unique for each individual. The numerical expression of the relation between accommodative-convergence and accommodation is the ACA ratio or AC/A.

The fusional supplementary convergence (FSC hereafter), or "near phoria," was measured monthly for 49 subjects. The FSC is not an independent variable, but is, rather, a manifestation of the AC/A relative to the heterophoria.[7] That is, the algebraic difference between the FSC and the heterophoria measurements is directly proportional to the AC/A. This concept will be more precisely elucidated by the formula to be given below. Because of the dependence of the FSC on the AC/A an analysis of the FSC *per se* will not be attempted but rather an analysis of the more meaningful variable, the AC/A, will be undertaken.

From the FSC measured at 0.4 meters, and the heterophoria measured at 6.0 meters, the AC/A may be calculated by the method of Fry[8] with the following formula.[9]

$$AC/A = PD + (F\text{-}P)\ (0.4)$$

where

PD = interpupillary distance, expressed in cm.
(F-P) = algebraic difference between the distance heterophoria, P, and the FSC, F.
Exophoria designated by minus sign.

This formula was employed to calculate the AC/A values to be given later.

Visual Acuity: The monocular visual acuity was determined with the Snellen chart at six meters.

RESULTS

Ametropia: It was found that 97 (95%) of the 102 eyes remained essentially constant throughout the duration of the study with a range ≤ 0.75 D. There were 5 (5%) that showed a range > 0.75 D. Three of the 5 had a range of 1.00 D. and two a range of 1.25 D. In these five eyes the month to month change was erratic and did not show a consistent trend of change. Because of this it is felt that these sporadic changes do not indicate actual change of refraction due to pregnancy.

The plotted curves of the monthly variation in refractive error of the 95% that fell with a range of 0.75 D. were characterized by a saw tooth pattern, and this would support the idea that this variation was error of measurement rather than any real change in ametropia.

The standard deviation of the differences between the two most different monthly measurements, out of the five or more monthly measurements, was calculated to be 0.29 D. This is in approximate agreement with Hirsch's average figure of 0.34 D.

The slightly lower standard deviation in the present study may

be partially attributed to the fact that all the subjects were adults and therefore probably had less fluctuation of accommodation during the test than children (Hirsch's subjects were children).

It could not be established in this study of 51 women that pregnancy is associated with any systematic or significant change in ametropia.

Heterophoria: The lateral heterophoria of 49 subjects was measured. Two of the original 51 had constant strabismus and were not included in those parts of the study that were concerned with binocular vision.

It was found that 48 subjects (99%) maintained a constant heterophoria within the error of measurement, which has previously been shown to equal 1.5 Δ. Therefore, no systematic relation could be shown to exist between pregnancy and heterophoria.

Amplitude of Accommodation: The 45 subjects in this part of the study fall in the following four groups:

(1) 27 (60%) Stable amplitude throughout (i.e., ±0.75 D. or less).

(2) 7 (15%) Amplitude decreased by more than 1.50 D., but recovered during third trimester.

(3) 9 (21%) Amplitude decreased by more than 1.50 D., but did not recover prior to parturition.

(4) 2 (4%) Responded erratically.

One subject from each of the first three groups has been selected and their data are presented in Figure 1. These curves will serve as representative samples.

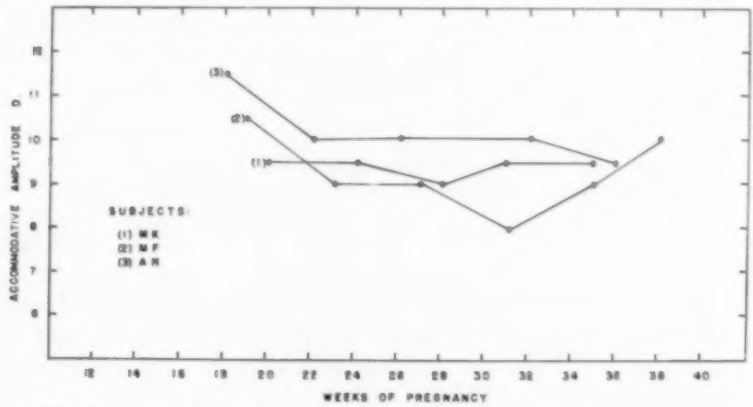

Fig. 1. Amplitude of Accommodation. Representative sample curves from groups (1) to (3).

All those affected by a drop in accommodation had sufficient initial amplitude so that near vision was not impaired, but by extrapolation into the older age groups one might expect approximately 1/3 of near-presbyopes (i.e., those whose amplitudes are within 1.50 D. of the limit at which a near add is required) to require a temporary reading add when their amplitude dropped in the presbyopic range.

Unfortunately, those whose amplitude did not recover during pregnancy, group (3) above, were not available for study after delivery. The etiology of the decrease in accommodation is not known.

ACA Ratio: The AC/A was calculated for each patient and it was found that 25 of 49 subjects retained a constant ratio, within $\pm 1\ \Delta$/D. This group constitutes 51% of the sample and will be referred to as group (1) hereafter. Those whose AC/A did not remain constant fall within the following four groups:

(2) 11 (23%) Decrease of ratio by more than 2Δ/D.
(3) 2 (4%) Increase of ratio by more than 2Δ/D.
(4) 4 (8%) Decrease of more than 2Δ/D. with subsequent recovery.
(5) 7 (14%) Erratic changes.

A representative from each of the first four groups was selected and their data are presented in Figure 2. These curves will serve to indicate what might be encountered.

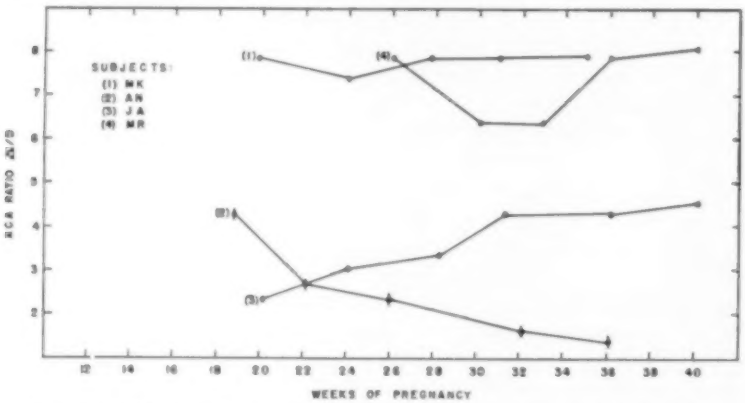

Fig. 2. ACA ratio changes. Sample curves representing groups (1) to (4).

Visual Acuity: Visual acuity was measured each month and in only 2 out of 102 eyes did the acuity vary more than one Snellen line.

DISCUSSION

The change of AC/A in 49% of the subjects is rather difficult

to reconcile with the evidence of the innate fixed nature of the AC/A.[10, 11, 12] Therefore, the theory is advanced that the change is not actually a change in AC/A, but is rather a manifestation of monthly fluctuation of the proximal convergence. In using the previously given formula to calculate comparative AC/A values it has been assumed that proximal convergence remained constant, and also that the difference between stimulus and response remained constant. These assumptions may not be justifiable.

In some cases this change in AC/A will not be clinically significant, but in others, such as in determining the near add for a patient with considerable "near esophoria" and insufficient negative fusional reserve, the AC/A is the basis for prescribing and the change of the ratio would render the prescription of the near add incorrect, such as in the case of subject AN in Figure 2.

Of the 51 subjects there were 36 (71%) who showed some change in excess of the error of measurement, erratic or otherwise, in one or more of the four functions: (1) ametropia, (2) heterophoria (3) amplitude of accommodation, (4) AC/A. Of those 36, 55.5% varied in just one of the four functions while 44.5% varied in two or more. That is, any subject who showed a change in one function had a "50/50 chance" (actually 55.5/44.5) of exhibiting a change in one or more of the other functions.

There are many criticisms of the present study and included among them would be the following:

(1) There were no data for the first 16 weeks of pregnancy, and therefore no information regarding ocular status during that period unless one extrapolates, and that seems unjustifiable in this type of study.

(2) A larger number of subjects would have been desirable.

(3) No data could be obtained for either the preconception or post-partum periods.

(4) There was no control group. Inferred in this study has been the idea that our knowledge of the ocular status of the general public would serve as the "control group."

SUMMARY

The findings from five or more monthly eye examinations of 51 pregnant subjects have been presented. The possible effects of pregnancy on the following functions have been explored: (1) ametropia, (2) heterophoria, (3) amplitude of accommodation, (4) ACA ratio, and (5) visual acuity. The following conclusions have been reached for this group of subjects:

(1) Pregnancy is not associated with a significant change in ametropia, heterophoria, or visual acuity.

(2) There were 7 subjects (15%) whose accommodative amplitude fell and then returned to the former level and there were 9 (21%) who showed a drop without subsequent recovery prior to parturition.

(3) There were 11 subjects (23%) who showed a decrease in the AC/A without recovery prior to parturition: 4 (8%) who showed a decrease with subsequent recovery: and 2 (4%) who showed an increase in AC/A.

(4) Any subject experiencing a change in one function was found to have a "50/50 chance" of showing a change in one or more of the other functions.

As to the clinical applicability of this study the following two impressions are presented:

(1) A temporary reading add may be required during pregnancy for some older patients.

(2) A change in apparent AC/A may be encountered in some pregnant patients which would render a spectacle prescription incorrect after two or three months.

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VISUAL BEHAVIOR OF THE RETARDED CHILD*

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One of the very early problems in the history of psychology was the problem of the relationship between figure and ground. In investigations of the figure-ground problem, it soon became apparent that closely related to this problem was the problem of form. The relationships between figure and ground were found to be dependent upon the way in which individuals combined elements of perception into elementary wholes or forms. The retina of the eye (or the sensitive cells of any other sense organ) sends to the brain a conglomeration of neural impulses. These impulses are the result of the firing of individual sensitive cells at or near the surface of the organism. In this conglomeration of impulses are certain patterns corresponding more or less closely to patterns in outside energy impinging upon the organism. The brain must sort out these patterns and translate them into perceptions of objects and relationships. Something more than the reception of the stimuli must occur before certain parts of the mass separate out from the rest and appear as a definite shape such as a straight line, an angle, a square, or a circle. Form must be fabricated by the brain out of a mass of efferent neural impulses patterned in space and/or in time.

It will be our thesis in this paper that the development of form perception is one of the major problems in dealing with retarded children. We are particularly interested in the problem of form perception in the area of vision for two reasons. In the first place, vision is our most efficient sensory receptor. It gives us more information per unit of time and information from a broader area in space than is yielded by any other sense modality. For this reason, psychologically we tend to build up our concepts of the world and the form relationships which constitute these concepts in terms of visual sensations as a core. We do not overlook other sensory stimuli. Information from other sense fields enters into the visual perceptual process as truely as do impulses from the retina. However, because of its extreme efficiency, we tend to organize or integrate the information from other sensory fields around

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visual data as a core. We implement or elaborate visual data with other sensory data, but maintain the predominant position of the visual information.

In the second place, we have a neurological reason for considering vision predominantly. The projection area of the cerebral cortex devoted to receiving stimuli from the visual sense organs is larger than the projection areas devoted to all the other sense organs combined. Thus, not only does vision become our most important sense psychologically, but also neurologically. The organism is set up to build its form perceptions assigning the greatest priority to visual data.

We can build up a world and we can build up figure-ground relationships using other senses without visual data at all. The exceptional abilities of blind individuals and the adjustment of certain lower animals who use other sense areas in the primary position illustrate the possibility of such alternative procedures. However, I think we would all agree, that no matter how astounding these adjustments may appear, they lack the total efficiency contributed by the visual data. Therefore, we will consider the significance of form perception in retarded children and we will be particularly concerned with the visual sense modality.

The importance of form perception in the day to day activities of the human organism was first stressed by the Gestalt school of psychology. Wertheimer,[12] Kohler,[6] Koffka[5] and others emphasized the predominance of form in the perceptual process. They derived the laws on the basis of which form is generated and built an entire school of theory around the significance of this process. Gestalt psychology has had a tremendous influence upon our current thinking. Through theoretical deduction and a tremendous number of laboratory experiments, they gave us an unforgetable awareness of the significance of form perception in the total response of the human organism.

Recent research is indicating that at one point in their exposition, the Gestalt psychologists may have overlooked an important concept. It was their belief that form perception was an innate process of the human organism and that the laws of form operated without alteration and without development or learning. It seems probable that they were led to this position by the nature of their experimental subjects. For the most part the great wealth of their laboratory experiments used as subjects the psychologists themselves or students in colleges and universities. At the level of the adult, form is so predominant and response to form is so natural and so compulsive, that we cannot imagine a time when it was different. Recent research suggests that in the early

life of a child this dominance of form is not present and that, as a matter of fact, a great deal of learning has to take place before the responses to form which characterized the adult become possible.

Considerable information on this subject has been provided by the studies of Senden[9] and Riesen.[8] Senden's work is a compilation of the studies thus far reported involving visual responses of congenitally blind patients who have been given sight by surgical operations. Riesen's work is a report of the visual responses of chimpanzees who were raised in total darkness until an age when the normal animal would have definite visual response patterns. These studies cannot be accepted uncritically because, in the former, adequate controls were not used in all cases and certain relevant observations were not made in a controlled fashion and, in the latter case, because of the possible differences between the chimpanzee and man. However, in spite of these weaknesses, we can, from these reports of visual response in unique situations, gain some hints as to the probable development of the perceptual process.

Senden found that among his patients, visual form perception was not spontaneous upon restoration of sight and as a matter of fact was not complete, even after considerable periods of learning. He reports cases in which there was an immediate perception of differences in two figures seen together, but also a number of instances in which even this was not possible. Thus, a patient sometimes saw differences between a sphere and a cube, sometimes not. Color was found to dominate form persistently in the first vision of these patients. Eleven months after operation, the color names, learned by a patient in the hospital, were retained, but the little that was learned of form was forgotten. An egg, potato, and cube of sugar were seen by a patient repeatedly, until naming was prompt, but then were not recognized when put into colored light; the cube of sugar was well named when it was seen on the table or in the investigators hand, but not recognized when suspended by a thread with a change in the background.

A patient was trained to discriminate square from triangle over a period of thirteen days, and had learned so little in this time that he could not report their form without counting their corners one after another. And yet it seems that the recognition process was beginning already to be automatic, so that some day the judgment "square" would be given with simple vision, which would then easily lead to the belief that form was always simultaneously given.

From these and similar observations, it is beginning to appear that form perception is a learned process and that in the infant and

young child form as we know it does not appear. The young child probably does not see objects as unitary wholes separated from the rest of the environment and with definite shape until considerable learning has taken place. Harlow[2] suggests that the only innate perceptual factors are "size of differential brightness hue areas in the perceptual field, steepness of gradients between the parts of the visual field containing the differential areas, and total boundary extents." He feels that such variables as shape, direction, distance, spatial relationships and the like are all the result of an elaborate learning process. The experiences of Strauss and Lehtinen[11] with brain-injured children and our own experiences with retarded children in the public schools lead us to believe that such learning is often interfered with or delayed. It is our feeling that inadequacies in recognition of form and in separating figure from ground lead to many of the difficulties experienced by the retarded child.

Essential to the development of form is the development of contour. In developing a more nearly complete perception from the primary sensory impressions, it is necessary to become increasingly aware of the point of sharpest inflection in the light density gradient. This point of steepest inflection defines the boundaries of the figure or the contour. It is the identification of differences in contour which permits us to separate one figure from another. The difference between a circle and a square is not a difference in the figure-ground relationships themselves, but a difference in the contours of the figures. Comparison between the different contours is then necessary so that differences are pointed up and become prominent. Thus, in newly seeing patients, although the segregation of figure-ground is good, even the most intelligent patient must carefully seek out corners to distinguish between a square and a triangle. Even when the differences are noted, they are frequently not remembered so that the patient who has successfully differentiated between a square and a circle on one presentation, cannot identify the square alone on a subsequent presentation. The contour of one figure must come to be differentiated from that of other figures and remain so over time.

The comparison of contours is necessary to determine the similarities between figures as well as the differences. It is not only necessary to learn to differentiate between a square and a circle, but also to recognize a circle when the conditions of stimulation are different. Thus, a newly seeing patient who had learned to name a square made of white cardboard could not name it when its color was changed to yellow. Such a process involves generalizing, which requires the identification of similarities between contours, and differentiating between

those aspects which are essential similarities and those which are unessential similarities.

Contour is not a matter of retinal stimulation alone. It is true that contour depends upon gradients of light which are given us by the retina. It depends more exactly upon changes in light density gradients, since a steady brightness gradient gives no contour at all. The contour involves, however, in addition to the gradients given us by the retina, a central factor which coordinates these gradients into the boundaries of a figure. It involves the coordination of gradients in special ways so that they can serve special purposes. This latter function of a contour is a learned process.

We take contour so much for granted and the construction of contours in any visual field is so compulsive for us as adults, that we often forget that the development of contour is a learned task and that we did not always proceed in our present manner. The behavior of the brain-injured child shows us how difficult a learning task this really was. Let us take the case of a brain-injured child who was asked to color a square drawn with penciled outline on a piece of paper. He took the crayon, much as does the very young child, and colored the paper. He was unable to stay within the lines and colored indiscriminately the figure and parts of the surrounding field. He could not construct and maintain a contour which would permit this square to take on the aspects of figure with the paper as ground.

The case of an eight year old brain-injured boy with a Binet IQ of 140 illustrates the point dramatically. He was given the same task —that of coloring an outline drawing of a square on white paper. His first attempt was similar to that which we have come to expect— he was unable to stay within the lines, but colored indiscriminately in the neighborhood of the figure. With special instructions to "stay within the lines" and "be very careful not to get outside the lines," he was still completely unable to accomplish the task. In order to simplify the task, he was given a cardboard template which formed a frame for the square he was coloring. By placing his crayon in this frame and allowing him to color until his crayon hit the sides of the frame, he was able to achieve a well colored square figure. After he had achieved success by this method a few times, he suddenly said to the teacher, "Take it away. Take it over there across the room." When the teacher had backed across the room with it, he suddenly said, "Look, it sticks out. The square sticks out from the paper."

For the first time in his life, this eight year old child with a Binet IQ of 140 had *seen* a figure stand out from a background. For the

first time in his life this child had been able to construct for himself a contour of sufficient structuralization and of sufficient holding quality so that it would produce for him a form out of a background. Thus, we see that essential to the problem of form is the problem of contour.

The relationship between ability to develop contour and achievement in school has been investigated in a recent study[7] sponsored by the Lions Club of Winter Haven, Florida. In this study the ability to develop contour and form was measured by ability to copy simple geometric forms. A test involving such form copying was constructed and a method of scoring the reproductions made by the children was devised. The correlation between the copying scores and school achievement as measured by the teacher's judgment was +0.52. This study involved 1,500 children in grades one, two and three. In view of this large number of cases, it is felt that this coefficient is of extreme practical importance.

We might well ask the question, "What lies behind the development of contour in young children?" In this connection, Hebb[8] says:

> "In their stimulating statistical approach to the problem of visual acuity, Marshall and Talbot have discussed a mechanism of summation at the borders of the projection of a visual excitation in area seventeen. In the absence of other influence, the heightened activity corresponding to the margin of a figure might dominate the total process. Walker and Weaver have shown a direct control of eye movement by peripheral stimulation of the visual cortex. The movement is in such a direction that the light source which produced such a peripheral activity would be fixated. In view of Walker and Weaver's work, Marshall and Talbot's discussion suggests that there would be a tendency to fixate, successively, various parts of the contour of an object. Also, with the intersection of lines there may be a further summation of the border effects, so that the foci of greatest activity aroused by a pattern in the visual field would correspond to its corners."

Hebb then goes on to develop further the idea that the construction of a contour is dependent upon multiple eye fixations around the boundary of a figure and that these multiple fixations involve either overt or implied movement of the eyes. The explanation advanced by Hebb certainly applies to contours of large figures, such, for example, as the contour of a room. Recent work makes it seem quite possible that the same type of eye movements may be responsible for smaller contours such as those of a form on paper.

If Hebb's explanation is true, then it follows that the ability to make accurate and rapid movements of the eyes is important to the development of contour and hence, important to the development of form. The eye is controlled by six extra-ocular muscles arranged in pairs. The movements which result from the activities of these muscles are basic perceptual-motor skills which must be learned by the child.

We know that the young infant does not possess these skills and

that his eyes move erratically and in an obviously uncontrolled manner. What is not so commonly observed is the fact that finer and more precise eye movements such as are required in the detailed form perception involved in school classroom work are much slower in developing. In any school classroom a significant number of pupils will be found in whom these movements have not attained the skilled level required by the work which has been assigned them. It has been our experience that children whose school achievement is below expected, are particularly apt to show a lack of ability to control the eyes with accuracy and precision.

In a recent study at Purdue University,[4] the eye movement skills of 50 kindergarten children were tested. The scores on this test of movement skills were correlated with school achievement scores as measured by the Metropolitan Achievement Test, Primary Form. The resulting correlation coefficient was +0.456. This coefficient is statistically significant and is of considerable practical importance in view of the difficulty of obtaining predictive instruments at the kindergarten level.

In the light of these and similar studies, it is our feeling that basic school achievement is to a large degree a problem of form perception. Behind form perception lies the problem of contour and behind the problem of contour lies the problem of control of the movement of the eyes. One logical attack on the problem would move in the opposite direction. Since control of extra-ocular muscles is a simple perceptual-motor task, it is amenable to training and learning. When we have achieved efficient control of the eyes, we can attack the problem of contour and hence the problem of form.

It is obvious that form perception is important in the problem of reading. We are most accustomed to think of the perceptual problems of reading in terms of the mechanics of seeing a word on a page. We recognize that the eye must move smoothly across the line of print, must sweep accurately back to the beginning of the next line and move accurately across again, etc. We recognize that in conjunction with all these movements, letter forms and word forms must be recognized quickly and accurately. Our attention is called to these problems by the child who reverses letters in words or who skips words or loses his place in a line of print.

Of equal importance with the problem of form in the mechanics of reading, however, is the problem of form in obtaining meaning from the printed word. The word is a symbol. The symbol, as it exists in the mind of the child, is a form or an integration of numerous forms.

Here again, the problem of form shows itself to be extremely important. Without good basic form we cannot have good solid symbolism. Many a child who has mastered the mechanics of reading has been unable to master the problem of obtaining meaning from the printed word. As a result, he becomes a word caller. We think of this problem as a language problem. We frequently overlook the fact that behind the language difficulty may very well lie a basic difficulty in development of form and perception of figure and ground.

In this connection it might be well to take a new look at our testing and measuring devices for predicting success in reading and in school achievement. In a study just completed,[10] Metropolitan Readiness Test scores for 448 first grade pupils were compared with the actual achievement of these pupils in the first grade. The Metropolitan Readiness Test consists of six parts: (1) word meaning, (2) sentences, (3) information, (4) matching, (5) numbers, (6) copying. The first three of these sub-tests may be considered verbal tests and the last three may be considered perceptual tests. In the present study, each of the sub-tests was independently compared with first grade achievement. The median differences between high achievers and low achievers (expressed as percentage of total possible score) for the verbal tests ran consistently positive, but low; 12.1% for word meaning, 12.2% for sentences, 7.9% for information. For the three perceptual tests in the battery the differences were markedly greater: 24.8% for matching, 37.0% for numbers, 41.0% for copying. This study would suggest a point that has frequently been overlooked in our concentration on total test scores. The contribution of perceptual skills to prediction of first grade achievement is more than twice as great as the contribution of verbal skills. Thus, the importance of form is present, but frequently overlooked in our normal educational testing devices.

We have suggested that training in these perceptual skills is possible. In many cases, the training problem is a simple one. We need only to give the child a little direct practice in the kinds of skills which we expect him to use in the classroom situation. Such training can be integrated with normal classroom work. We are currently experimenting, in cooperation with the Lafayette City Schools, in revising the curriculum and activities of first grade classes to incorporate such training into regular first grade classroom work. In other cases the training problems will be more difficult and cannot be handled in the classroom. In these cases a vision specialist must be consulted and the more complicated techniques available to him must be utilized.

The possibilities of such perceptual-motor training activities can

be illustrated by a preliminary study[1] in one second grade room. In this school, standard reading achievement tests are administered routinely at the end of each semester. We followed the achievement patterns of first grade classes in this school from 1953 to 1956. The test scores indicate that for these years, the classes varied in comparison with national norms from a low of one month below the norm, to a high of two months above the norm. In September of 1957 perceptual-motor training activities were integrated with the classroom work in this grade. The testing in January of 1957 revealed the fact that the current class is working at an average level eleven months above the national norm. This study is part of a larger project and is incomplete. However, it rather strongly suggests that achievement at the first grade level can be markedly affected by the addition of classroom activities designed to assist the children in the development of form perception.

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CORRECTION FOR THE GUESSING BIAS IN THE LANDOLT RING TEST*

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INTRODUCTION

When the Landolt ring is used for measuring acuity, there is a size below which a certain number of the rings which are called correctly are so-called by guessing. At this level the frequency that the break is called to the right is apt to be influenced by the fact that the ring is like the letter C when the break is to the right. It is also conceivable that the direction in which the break is called may be biased by other less obvious factors.

In a previous study[1] the relation of astigmatism to visual acuity was investigated and no allowance was made for this calling bias. The present study has been made to show to what extent a calling bias exists and to show how a correction can be made for it.

In the previous study[1] it was assumed that at the level of guessing the subject would call the breaks up, down, right and left with equal frequency. In the present study an actual count of these frequencies has been made.

METHOD

Two emmetropic observers viewed Landolt rings at 18 feet monocularly through a 3 mm. artificial pupil and a +1.50 D. sphere.

The Landolt rings of a given size were presented in four positions, up, down, left and right, for seven second periods with three second intervals between presentations during which time the ring position was changed, the order of presentation being scrambled in such a manner that it could not be repeated until 120 presentations had been made. A series of sixty such presentations involving the same size but different positions constituted a run. The experiment was repeated with rings of different sizes, 20/15, 20/20, 20/25, 20/35, 20/45, and 20/60.

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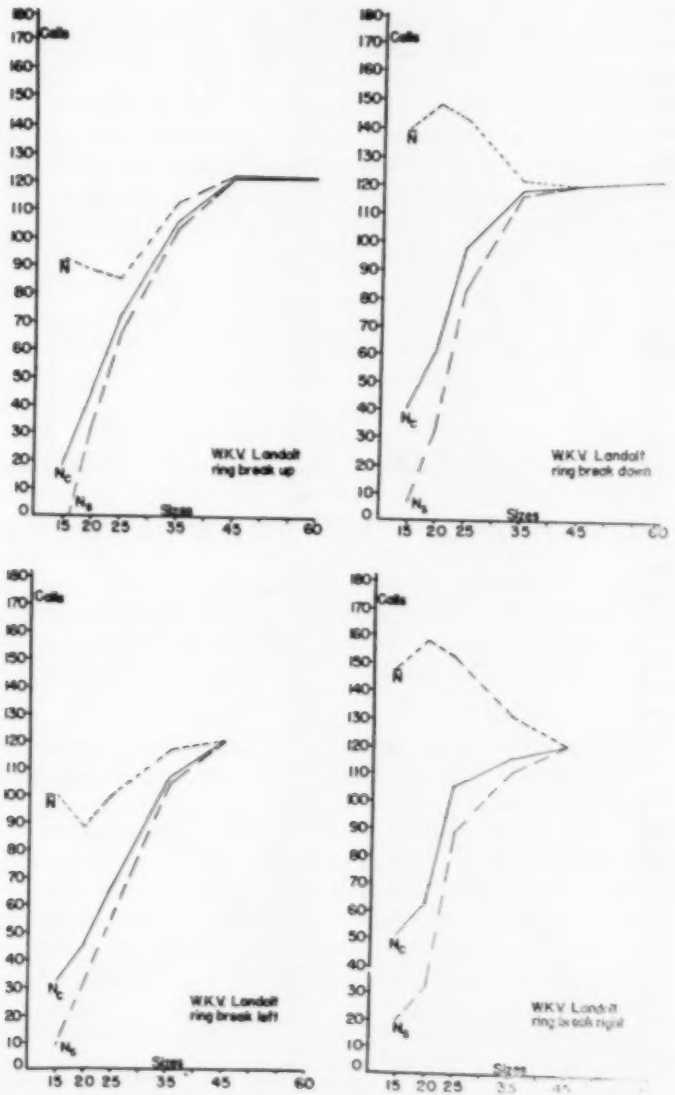

Fig. 1. Data for subject W. K. V. N represents the number of times the given position is called. N_c the number of times called correctly, and N_s the number of times actually seen.

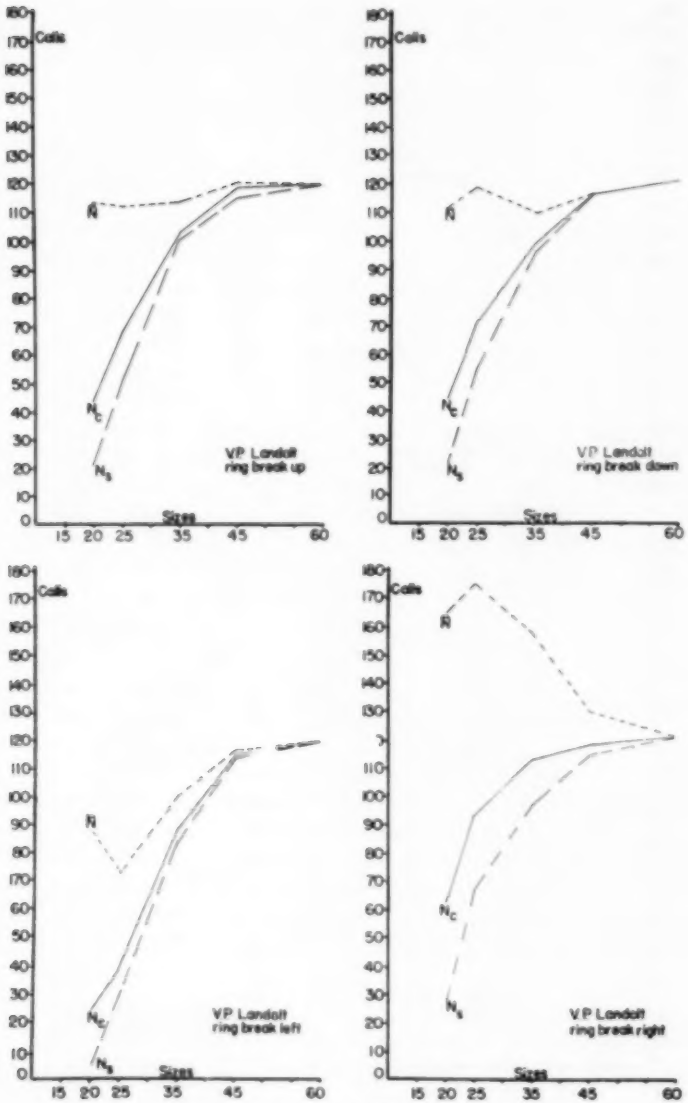

Fig. 2. Data for subject V. P.

Each subject made eight runs with each size ring.

At each presentation the subject pressed one of four keys to indicate where he saw or guessed the break to be. If his call was correct this was recorded by the electric counter assigned to this position of the break. At each presentation the experimenter recorded manually which button the subject pressed, whether right or wrong.

Hence at the end of each run the operator knew the number of times the ring was presented with the break at each position, the number of times each position was called and the number of times each position was called correctly.

The black Landolt rings were presented at the center of a white square field (5.6° in each direction) having a brightness of 80 ft.-L.

The apparatus is described in the previous paper.[1]

RESULTS

An equation has been devised which makes an allowance for guessing in the computation of the number of times that the target is actually seen. This equation can be applied in turn to the up, down, right and left calls. If we accept that

$$N_c = N_s + (\overline{N} - N_s)\ \tfrac{1}{4} \qquad (1)$$

where for a given direction $\overline{N}$ is the number of times the position is called, N_c the number of times called correctly, N_s the number of times seen and $\tfrac{1}{4}$ is the guessing level of a four position ring, then

$$N_s = \frac{4N_c - \overline{N}}{3} \qquad (2)$$

The raw and corrected data for calls to the right, up, down and left for two subjects are shown in Figures 1 and 2. In the case of W. K. V., only two runs instead of eight were made for the 15 ft. rings and only six runs were made for the 20 ft. rings. In the case of V. P. only six runs were made with the 20 ft. rings. In order to compensate for this, the scores have been multiplied by the appropriate factors to keep all of the data expressed in terms of eight runs.

It may be seen that the number of incorrect calls varies greatly between the positions of the breaks, and that in the position "Break to the right" and to a somewhat less extent in the position "Break down" the number of calls greatly exceeds the number of presentations. This obviously accounts for the much lower number of calls for the "left" and "up" positions.

Figure 3 represents another method of comparing the corrected and the uncorrected data. It may be noted that the corrected curves

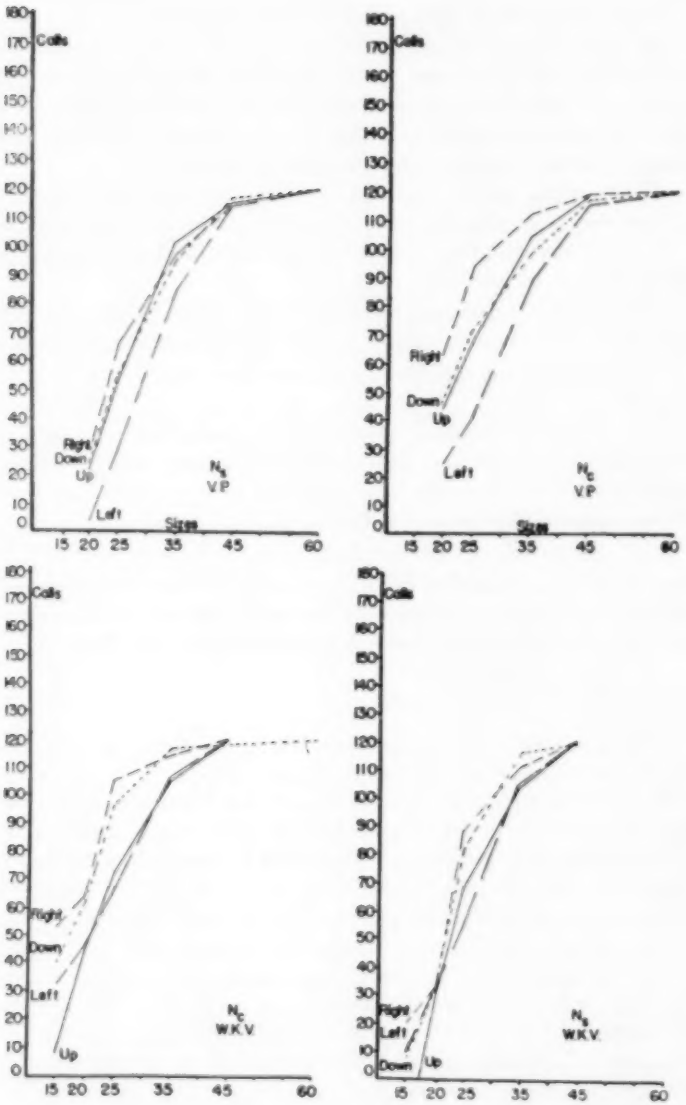

Fig. 3. Comparison of corrected and uncorrected data for subjects W. K. V. and V. P.

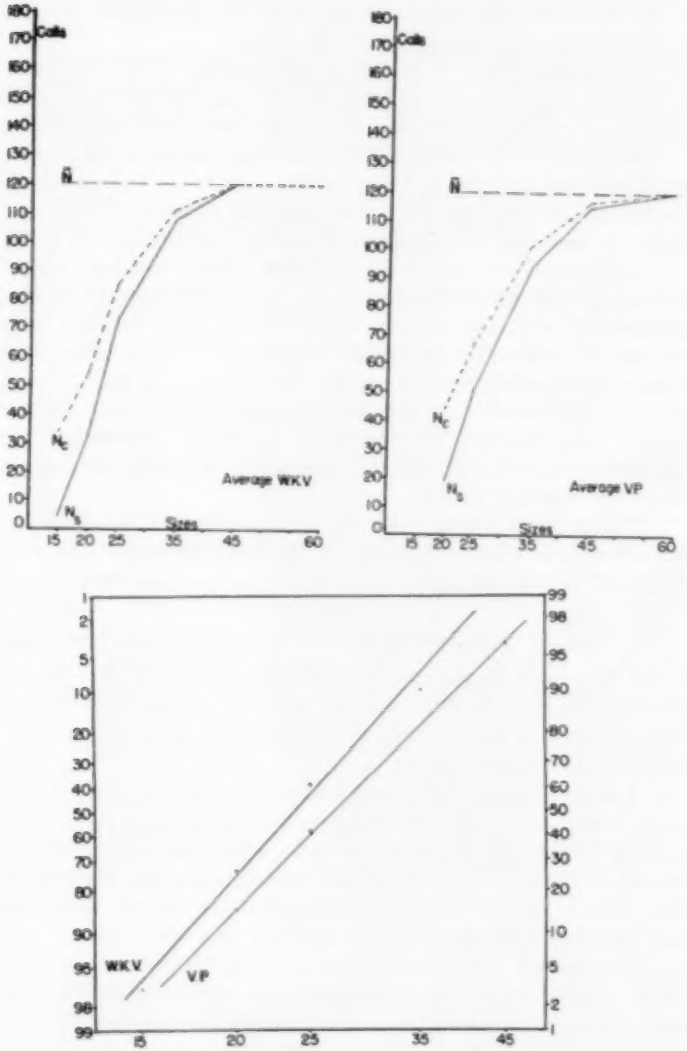

Fig. 4. Top. Average data for subjects W. K. V. and V. P.
Fig. 5. Bottom. Average data for W. K. V. and V. P. plotted on probability paper. The numbers on the vertical scale represent 100 $N_s/\bar{N}$.

for up and down are closer together than the uncorrected curves and the same holds true for right and left data.

The compensation, however, is only partial. The differences for the different meridians can be attributed to astigmatism but even after correction we still find differences for the two ends of the same meridian.

One kind of bias which has not been allowed for is the possibility that the subject may not be able to tell a right break from a left break even though he may be able to see that the break is neither up nor down. In this case the chance of guessing a correct answer is 50%.

In Figure 4 the curves for up, right, down and left have been averaged. If one is not interested in the factors that bias the up, down, right and left responses, one can work directly from the data without reference to position of the break. In this case, one is interested only in the number called correctly and the number seen. It may be assumed that the total number of responses is equal to the total number of stimuli. The equation for frequency of seeing [Equation (2)] is simplified as a result of the total number of responses being equal to the total number of stimuli.

The curves in Figure 4 for N_s can be computed by averaging the curves for N_s in Figures 1 and 2, or by using Equation (2) and the average N_c and $\overline{N}$ values in Figure 4. The values of $\overline{N}$ are constant at 120.

In Figure 5 the values of N_s have been converted to percentages of $\overline{N}$ and have been plotted on probability paper. The data plotted in this way can be fitted with straight lines. As explained in a previous paper the slope of such a line can be affected by astigmatism.

SUMMARY AND CONCLUSIONS

The experiment has revealed that when a Landolt ring is not clearly visible each of the two subjects is more likely to guess the break as being to the right than to the left. This bias may be due to the likeness of the Landolt ring to the letter C when the break is to the right. One of the subjects also shows a bias for "down" guessing over "up" guessing. No cause for this bias has been identified.

An equation for correcting data for such biases has been presented which is based upon the assumption that when the position of the break is not actually seen, the subject guesses the position of the break and has a 25% chance of guessing correctly.

This gives only partial correction for the bias in each of the two meridians.

Astigmatism may be a major factor in producing differences

between the two meridians of the Landolt ring when astigmatism does in fact exist.

The assumption of a 25% chance of guessing correctly is no doubt an over-simplification because there are instances in which the subject can detect that the break is not up or down, but cannot tell whether it is left or right. This pattern of response can occur when astigmatism is present.

Appreciation is expressed to Mr. Verne Petrie and to Mr. William Vincett who have served as subjects in the experiment.

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CORRESPONDENCE

ANTIQUE SPECTACLE FRAMES AS HISTORICAL PROPS

To the Editor:

Recently I had the problem of disposing of several dozen antique spectacle frames that had been collected in my father's practice over the past 65 years. My wife came up with the idea of calling up a professor of dramatics of a nearby college to determine if they could use them in their costume department. They were really appreciative of the gift and went to the bother of classifying them into the proper historical era. In thanking us he said that his profession was always on the lookout for historical props of all kinds. I should add that we attended a play a short time later and found one of the cast using a frame from the Gay 90 era. Similar collections, in the hands of optometrists, may be welcomed at other schools.

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ANNOUNCEMENT DEALING WITH REFERENCES AND BIBLIOGRAPHICAL MATERIAL

Beginning with the April issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF THE AMERICAN ACADEMY OF OPTOMETRY, all bibliographic material, as far as this is possible, will be checked by the editorial staff. Grace Weiner, a graduate of the Ohio Wesleyan University, who has had long experience in professional librarianship and is at present librarian of the Los Angeles College of Optometry, has joined the Journal staff as Bibliographic Editor and will edit all references.

The style to be followed by the Journal will be uniform and will be in accord with the following:

(A) Headings.

If reference is made to the material in the body of the paper, then the heading will be "References." If the material is background

material and no specific references are made, then the heading will be "Bibliography." If the material is not in the body of the paper, but would serve the interested reader in gathering more information about the subject, then the heading will be "Suggested Readings." References will be listed in the order of their appearance in the body of the paper; "Bibliography" and "Suggested Readings" will be listed alphabetically.

(B) Footnotes:

Footnotes will seldom be used, but all bibliographic material will be listed at the end of the article under the heading of "References." If the sense of the paper demands a reference to a specific page, then the complete reference will be listed with an appropriate number, and each page number will be listed by this number followed by a small letter. This new concept is best illustrated by an example. Suppose that there are in the body of a paper three specific quotations from Donders' book and that the author wishes to refer to these specific pages. The reference would be written as follows:

7) Donders, F. C. On the Anomalies of Accommodation and Refraction of the Eye. The New Sydenham Society, London, 1864.
7a) Page 141.
7b) Page 184.
7c) Page 211.

In the body of the paper the symbols 7a, 7b, 7c would be used at the appropriate places. It is hoped that this innovation will remove the "op. cit." and "ibid." which necessitate hunting back for the original reference from bibliographies.

(C) Book References:

The following form will be used for book references:

(a) The author's last name, followed by a comma and his first name or initials. If there are two authors, the second author's name will not be inverted. Thus, it will be "Smith, John and Joseph Brown," rather than "Smith, John, and Brown, Joseph." The author entry will be followed by a comma.

(b) The title of the book will follow the name and will have all major words capitalized. This will be followed by a comma.

(c) If there has been more than one edition, this will follow the book title and will be an Arabic numeral followed by the abbreviation "ed." Thus, "3rd ed." This will be followed by a comma. If there is more than one volume, the volume will follow the edition number or title, and the word "volume" will be abbreviated as "Vol." and will be followed by an Arabic numeral. The volume number will be followed by a period.

(d) The city in which the book was published will come next,

followed by a comma, and then the full name of the publisher. If the city may not be known to our readers and is in a foreign country, then the country will be listed also. Large foreign cities, however, such as London, Paris, etc., need not be followed by the country. The city will be followed by a comma.

(e) The year of publication will be listed next, followed by a period. The following would be a complete book reference:

> Smith, John and Herbert Brown. The History of Spectacle Lenses. 6th ed., Vol. 2. Newcastle, England. Johnson Publishing Company, 1954.

(D) Paper and Article References:

(a) The name or names of the author will appear in the same form as for book references and will be followed by a comma.

(b) The title of the paper will follow, and only the first word will be capitalized. This often-used convention enables the reader to tell at a glance whether a reference is to a book or a paper. The title will be followed by a comma.

(c) The name of the journal in which the article appeared will be listed next, followed by a comma. The following abbreviations will be used:

Acad.	Academy	Ophth.	Ophthalmology or Ophthalmological
Am.	American	Opt.	Optical
Arch.	Archives	Optom.	Optometry or Optometric
Assn.	Association	Physiol.	Physiology or Physiological
Brit.	British	Psych.	Psychology or Psychological
Bull.	Bulletin	Rev.	Review
Dept.	Department	Soc.	Society
J.	Journal		
Med.	Medical, or Medicine		

State names will have the standard abbreviations.

All other names will be fully spelled out.

The words "of" and "the" will be omitted but the word "and" will be included.

If an article is written in a language other than English, but one which uses the Roman alphabet (French, German, etc.) the title will be given in the original language. If the language is one which does not use the Roman alphabet (Russian, Japanese, etc.) the title will be translated into English and will be followed by the name of the original language in brackets.

(d) The volume number will follow the journal name. This

will be an Arabic numeral. If the number is included, this will follow the volume number and will be set apart by parentheses. The volume or number entry will be followed by a colon. The month or date will not be used in journal references, but will be used in magazine references as mentioned below.

(e) Page references will include the first and last page of the paper separated by a dash and followed by a comma.

(f) The year will complete the reference and will be followed by a period.

The following would be a complete article reference:

> Smith, John, and Joseph Brown. The effect of base-out prism on hyperphoria. Am. J. Optom. and Arch. Am. Acad. Optom., 34 (5): 1189-1196, 1954.

(E) Monographs, magazines, and other miscellaneous publications.

(a) Monographs which were not published as journal papers will use the same form as books with the addition of any other pertinent information such as monograph number or agency sponsoring the publication (U. S. Dept. of Health, etc.).

(b) Supplements to journals will be listed as a journal article except that the title will be capitalized as a book if the entire supplement is devoted to a single paper. The supplement number in Arabic numerals will follow the name of the journal.

(c) Articles appearing in magazines which begin each issue with page 1 will be listed as journal articles, except that the day and month of publication will precede the year. Newspaper articles will follow this same form.

(d) Miscellaneous papers of various organizations will contain as complete a listing as possible to help the reader who may wish to refer to the article.

MONROE J. HIRSCH

TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

IN MEMORIAM

Anno Domini

1957

Dr. William H. Dowdell, Malvern, Arkansas
Dr. Lawrence P. Folsom, South Royalton, Vermont
Dr. George A. MacElree, Philadelphia, Pennsylvania
Dr. James Miller, Detroit, Michigan
Dr. E. H. Morrissey, Los Angeles, California
Dr. C. A. Taylor, Toronto, Ontario, Canada

Since our last annual meeting the Academy has lost six of its members through death. Each of these men played a significant part in the development of the profession and each by his splendid work has left his important mark on the present and future of optometry. All have been active in the Academy. We miss these important leaders and the membership of the Academy at this time pays tribute to their memory.

(From the minutes of the Chicago, Illinois, meeting of the Academy.)

OBITUARY

L. GERALD LEONARD, 1927-1958

Dr. L. Gerald Leonard died on January 13, 1958, at the age of 31. The cause of his death was diabetes. A Minneapolis native and son of a north Minneapolis physician, Dr. Leonard attended Marquette University and Macalester College and was a graduate of the Chicago College of Optometry. Three years ago he moved to a new clinic building in north Minneapolis, erected by himself and a dentist.

Dr. Leonard was a member of the Knights of Columbus, Minnesota Optometric Association, a fellow of the American Academy of Optometry, a member of the Minneapolis District Optometric Society and Phi Theta Upsilon. He was active in Big Brothers, YMCA and Boy Scout work. His absence will create a void among his many colleagues and friends who have come to depend on his counsel and loyalty. He is survived by his wife and son.

PAUL SLATON, O.D.

PROFESSIONAL BUILDING
HOPKINS, MINNESOTA

SPECIAL REPORTS

A.O.A. PRESIDENTS' ANNUAL ADDRESS BEFORE THE ACADEMY — "BREAD AND POLITICS"*

Lester H. Sugarman†
Meriden, Connecticut

In appearing before you, ladies and gentlemen of the American Academy of Optometry, I feel that I am speaking to a group who have evidenced an emphasis on the intellectual aspects of our profession.

With sputniks and missiles and the exploration of outer space, the star of the intellectual—the so-called egghead—is rising in this country this very day—and for good reasons. The educator, particularly, is beginning to get the attention and prestige that he always deserved. We are finding that the purely practical man has his limitations.

In science, such as in vision and vision care, the purely practical man is limited by the frontiers which only the intellectuals can extend. In our daily work as practitioners, we are dependent largely upon what educators taught us, just as the engineers and technicians are in military defense.

Since I believe in science—long-hair science—I hope the day may come when it will be unnecessary to apologize for it. However, I am sure that some of you are already wondering whether I will recognize that you are *practical* too. I do. Many of optometry's best practitioners are Academy members. I suspect that those who are both intellectual *and* practical are best of all; and I'm quite sure they are in your ranks.

The program you sponsor for this annual meeting is a highly commendable one. The papers and courses offered here are in the best traditions of professional academies. I applaud the work of Bob Tubesing and Carel Koch, of the committee members, and speakers, who have made this feast of vision-care information available in such palatable form.

My function here tonight is to say a few words to you as spokesman for the A.O.A. You are steeped in an intellectual atmosphere here, and I take it that my job is to say, that just as man does not live by

*Read before the annual meeting of the American Academy of Optometry, Chicago, Illinois, December 9, 1957. For publication in the March, 1958, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

†Optometrist. President, American Optometric Association.

bread alone, optometry cannot live by intellectualism alone. The A.O.A. is primarily occupied with the development and execution of policies that govern our profession's relationships with the ever-changing society in which we find ourselves.

I trust, and I believe, that you have delineated your field so carefully that I need not emphasize the importance of our profession having a single, final clearing house on major basic policies. The A.O.A., as the creation of the various official state optometric associations throughout the country, has responsibility in that field: and must, therefore, have commensurate authority. The orderly procedure on policy matters for the profession, clearing through local and state associations, and then the House of Delegates of the A.O.A., works very well. So there is smooth and efficient operation when free men and women—discuss what they please, where they please, and then use the machinery set up for the purpose when they seek official action in the name of our profession.

Whether we like it or not, we are always deeply involved in politics. Much of A.O.A.'s activity is political in one sense or another, just as yours, whether in publishing or in holding meetings, is intellectual.

About three weeks ago I attended in St. Louis, a conference of the A.O.A. Committee on Social and Health Care Trends—which, by the way, is headed by one of optometry's great intellectuals, Doctor Felix Koetting. On the program of that conference were many labor union spokesmen. I noted that they frequently spoke of politics as the science of government. In our democracy—or republic—and in our democratic organizations, we are constantly engaged in the science of government—politics.

As President of the A.O.A., highly conscious of the burdens of responsibility for our profession, I should like to enlist your help with some of the political problems of optometry. I think that many of the most influential members of our profession are in this room tonight. If I, or some other force, could move you to become about one-tenth as politically conscious as the leaders of labor are, Utopia would not be far away for our profession.

But, to achieve that Utopia in the shortest possible time, it is essential that we have unity. Unity among every philosophy, every segment, every thought within optometry. We must decide among ourselves—we must blueprint—the goals for our profession. But once those conclusions have been reached, we must close ranks: we must

present a united front. Tonight, right here at your head table, I see the symbol of that unity. I stand here as the representative of organized optometry—the A.O.A. Here, too, are representatives of two great movements within Optometry—the American Academy of Optometry and the Optometric Extension Program. May this occasion serve as a beacon light to guide us. May it serve as a testimonial to the fact that tonight we have joined bands in a united effort for the ultimate achievement for our profession of its deserved and rightful place in the health care field.

I note that you have had a session here, led by Carel Koch, on optometry's relationship to ophthalmology, and medicine in general. I am quite sure that we all see eye to eye on the need for better interprofessional relations, and we probably differ little in views on the type of relationship we seek, or the method of achieving it. The problem is largely a political one.

Politics determine our relationship with medicine, not only through the laws of government, but also through the equally controling unwritten laws of daily custom.

Where the law prohibits discrimination against optometrists in school referrals, for example, we should use the science of government to achieve our rightful place. The same applies to the optometrists' position in military service, in state welfare programs for the indigent needing vision care, and to many similar areas of conflict with medicine.

This audience, I assume, is thoroughly aware of the mushrooming growth of group vision care plans. Optometry is probably being included in a decreasing *proportion* of these plans. I say "decreasing," because fast as our own programs and inclusion in other plans are growing, the whole field is growing faster. Fast as we run, we seem to be farther behind every day.

Now this, too, is a political problem—the science of using influence to change a custom. It is very heartening to know that thousands of labor union members who have been subjected to superficial medical eye-care programs or optician-sponsored programs now want good optometric care as much as we want them to use our services. Some labor leaders are doing more than many optometrists in their own communities to get optometric vision-care programs.

What is happening in far too many cases is that medical health programs are adding vision care, and with the same requirements as for other care—only a physician's bill for services will be recognized, regardless of where the union member formerly sought vision care. To a large extent, the solution depends on local optometrists who can educate

union leaders and members, employers and other leaders in the community on the qualifications of the optometrist.

Speaker after speaker at the St. Louis Conference said that the members and officials of health programs are not aware of the length or scope of an optometrist's education. This *has* been a basic point in optometry's public relations for many years; but we still have millions to inform, and *you* can do it best by carrying the story to your own patients and your own communities.

As you well know, there are differences of opinion among A.O.A. members—and probably in this very room—as to the desirability of A.O.A. encouraging group vision-care plans. Policy, then, is to make sure that optometry is included in all possible plans that originate with labor, management or other groups. We neither originate plans that might cover present patients nor discourage plans that are inevitable. It is imperative, however, for optometry to be included in the plans that *are* organized; and they are increasing at an accelerating rate.

You will be interested, I am sure, to know that your A.O.A. is actively engaged in insuring optometry's participation in group vision care programs. Just this past week, in Washington, I had the opportunity of sitting in two conferences with some of the principal labor leaders in the country concerned with this area of activity. I can attest to the fact that our advice and guidance is being sought at an ever-increasing rate. As one of the leading men in this movement said, "We are not qualified to set standards for vision care—we are interested in quality, and, for the standards that will insure it, we look to you, the professional organization, for direction."

I dwell on group vision care because it illustrates the value of good interprofessional relations and the handicap of strained relations. There is an ophthalmologist behind the scene when optometry is excluded from a plan. Perhaps we can change him from an enemy to a friend. It's worth trying.

The National Medical Foundation for Eye Care must at least be mentioned in any current discussion of interprofessional relations. Its charges against us are very serious. I think they must be met—but perhaps indirectly, rather than directly.

At the interim meeting of the A.O.A. Board of Trustees in Washington a few days ago, this was a major topic of discussion. You will be interested to know that we have begun to develop our own "white paper"—a "bible" on optometry—to serve as source material for you, and opinion leaders throughout the country. This will contain the basic facts about the place of optometry in modern vision care, the educa-

tion of the optometrist, the history of his education and licensing, the highlights of relations with medicine through the years, and an explanation of the activities of organized optometry.

Now, here, too, state and local societies and their members can do most to cultivate the friendship of the many ophthalmologists and other physicians who are willing to be friends, if they are assured of our good will. They need to be reassured continually that we do *not* seek to "enter medicine by the back door," or the front door, either. This is a cliche that has recurred in medical literature—propaganda—for years.

Remember, that medicine has been misinformed about us. Many physicians—potential and even actual friends—*believe* that official optometry at the national level has sought and seeks legislation prohibiting or limiting medical refraction, or permitting optometrists to prescribe for disease. We—you and I—can truthfully say that some unwise attempts have been made by individuals, but not with A.O.A. approval, or yours and mine. The *truth* is our most effective ally, and it is up to each of us to use it as extensively as possible with the members of other professions in our own communities.

So I say to you, let's be politicians as well as intellectuals. We need friends—as many and loyal as possible. We will not get them by sitting in ivory towers. We will get them by being the best possible practitioners from the standpoint of high quality optometric service; and then, by getting out among the influential people in our communities.

Let's systematically see to it that every ophthalmologist—every physician, if possible—is contacted by some optometrist and assured of the good will of our profession toward all who believe in and abide by the philosophy of live and let live.

As I have said to many other audiences, I say to you, the outlook for our profession is the best that it has ever been. I say this because I think we are practicing better optometry than we ever did before—providing a unique service—differentiating, as it does, between medical *eye* care, on one hand, and optometric *vision* care, on the other encompassing in its services, not just "sight care," but *total* vision care, in all its aspects and all its ramifications. This is being recognized by important people outside our profession. We have *more* to offer, and the public is beginning to know it. This means that we have more friends working for us—demanding, expecting and advocating modern optometric care, such as is not elsewhere available. Think how strong we would become if all optometrists—or most, at least practiced the

kind of optometry to which I refer. Someday they will, I'm sure. But that "someday" will be far in the future unless you and I strive actively and continually to lead more of our fellow practitioners to a fuller appreciation of the scope and extent of the unique service which is ours.

While we have problems of politics, interprofessional relations, and the like, they are not as grave as those that our predecessors survived. It is not uncommon for exceptional opportunities to be accompanied by exceptional challenges. A mark of a mature profession, which we are fast becoming, is that it keeps its eye on ultimate goals instead of being panicked by immediate problems. We are not likely to further our cause if we meet the attack on us today by striking back wildly at ophthalmology and dispensing opticianry.

As long as I am president of the A.O.A., we will not be appeasers, but neither will we be aggressors. I have no intention of resembling a weakling with an umbrella: but neither do I intend to ape him who rattled the sabers.

The positive approach is best—selling *ourselves* and our profession—cultivating friendly, interprofessional relations with physicians and members of *other* professions: who, in increasing numbers, are evidencing a friendlier attitude toward us. Today, there are favorable factors, just as in all previous stages of our development. Progress will come from focusing on *those*, rather than trying to tear someone else down.

I am reminded of that opening paragraph of Dicken's "Tale of Two Cities."

It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair.

The subtle admonition here, of course, is to have perspective: and I would say that this is a time when, by being optimistic, positive, constructive, we can move ahead faster than ever before. The prospect is *good* for more bread, smarter politics and a better climate for academic intellectualism.

38 WEST MAIN STREET
MERIDEN, CONNECTICUT

NON-OPTOMETRIC CAREERS AMONG OPTOMETRY SCHOOL GRADUATES*

Henry W. Hofstetter†
Division of Optometry, Indiana University
Bloomington, Indiana

During the latter part of 1956 and the early half of 1957 each of the optometry schools and colleges was requested by the Association of Schools and Colleges of Optometry to submit a list of names of as many alumni as they could identify as "pursuing careers other than the clinical practice of optometry." Since none of the school alumni officers routinely maintained a file on this type of information, the lists were gleaned primarily from the personal knowledge that school and alumni officers happened to have concerning their graduates. Eight of the 12 A.S.C.O. member schools supplied actual lists, the secretary of the alumni association of a recently discontinued school supplied a list, two schools of recent establishment reported no graduates in this category, and two schools did not respond. A few additional names were obtained from various other sources. Altogether, a total of 190 names and addresses was accumulated.

A questionnaire with a covering letter and a self-addressed stamped envelope was sent to all 190, of which 10 were returned because of incorrect address. Of the 180 that may be presumed to have been correctly addressed, replies were received from 65, or 36%. Of the 65 replies, nine were ruled out as inapplicable because the respondents were in fact engaged in clinical optometric careers either in private practice, as optometry officers in military service, or as optometry school faculty members.

The 56 replies used in this report came from 22 different states, with over half, 32, coming from the states of Ohio, New York, and Pennsylvania, and the province of Ontario, and the remaining 24 from 18 other states, with no more than two from each.

The questions were worded as follows:

1. Name: Date
2. Address
3. I attended the following schools, colleges, and universities:

Institution	Major	Dates of Attendance	Degree

*Report of a survey started while the author was president of the Association of Schools and Colleges of Optometry. Submitted on October 1, 1957, for publication in the March, 1958, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

†Optometrist, Ph.D., Director of school, Fellow, American Academy of Optometry.

4. I am licensed to practice optometry in the following states:
5. My principal occupation at present: (Describe or give full title, employer, etc.)
6. Give a brief statement of the circumstances or factors that led you into this type of career:
7. Number of years engaged in this type of work (Describe progress or chronological sequence of activities if helpful in clarifying this answer):
8. Was it your intention to practice optometry when you entered optometry school? If not, describe your original objectives.
9. In your present occupation do you routinely identify yourself as an optometrist or optometry graduate? I.e., do your associates think of you in terms of your qualifications?
10. Do you practice optometry at all? If so, how much?
11. Do you consider yourself as having special or useful qualifications for your present work as a result of your optometric studies?
12. If so, what courses in optometry school were most valuable in this regard (list in order of importance).
13. If you were preparing yourself anew for your present career would you consider any or all of your optometric education important in this preparation? If yes, explain.
14. Is there a need or opportunity for more optometry graduates in your type of work? If yes, what supplementary training or experience would be desireable or necessary to qualify?
15. Of what optometric organizations are you a member?
16. Do you think that present day optometric curricula should be broadened or adapted to prepare some of the graduates for the type of work that you are in? Explain.

Of the 56 who submitted applicable replies, 14 had entered the field of medicine or were in medical school. The other 42 were engaged in careers too diverse to list or classify satisfactorily. Some appreciation of the diversity may be gained from the following arbitrary classifications adopted purely for the purpose of illustration: Engineering careers not related to optics, vision, or optometry, 3: illuminating, optical engineering, optical physicist, and optical research, 10: chemistry or biology, 2: photography, 1: accounting-auditing, 1: teaching, 3: administration, 4: non-optical business, 10: optical manufacture and sales, 6: mathematics, 1: airline pilot, 1. Only two women were among the respondents, both in non-medical careers.

Because the interpretation and significance of the questions seemed to differ considerably for the medical respondents, they are evaluated separately. The 14 respondents in this category included six practicing ophthalmologists, one cancer specialist, six medical students, and one osteopathic student.

The dates of graduation of the 56 respondents represented a remarkably extensive sampling, as follows:

	Non-Med.	Med.
1920-1929	4	2
1930-1939	8	4
1940-1949	16	3
1950-1955	14	5

Of the 42 non-medical respondents 16 had been graduated from university affiliated schools and 26 from non-affiliated schools. Eleven of the 14 medical respondents had been graduated from university affiliated schools.

From the replies to question No. 3 given by the 42 non-medical respondents estimates were made of the number of years of college level work not included nor required for graduation in optometry. These tally as follows:

No. of years	No. of respondents
0	21
1	5
2	9
3	2
4	3
5	0
6	2

In about half of these cases the extra training was acquired prior to entering optometry, and in the other half subsequent to graduation in optometry. The extra, non-optometric degrees included 13 baccalaureate, five masters, and three Ph.D.

Of the 14 medical respondents, two had obtained non-optometric degrees other than the M.D. degree.

The number of state or provincial optometry licenses currently held by both groups is as follows:

No. of licenses	Non-Med.	Med.
0	2	2
1	21	8
2	15	3
3	4	1

The answers to question No. 6, and other relevant comments, were classified in terms of the apparent "reasons" for leaving or not entering into a career representing the clinical practice of optometry. Where more than one reason was given, both or all were tallied, as follows:

Reason	Non-Med.	Med.
Dissatisfaction with profession	1	2
Scope of optometry too limited	1	3
Special aptitude, opportunity, or interest in present work	30	9
Financial difficulty or necessity	14	0
Unable to obtain license in state of choice	2	1

All of the medical respondents and 38 of the non-medical respondents indicated their intent to practice optometry upon entering optometry school. Three of the non-medical respondents definitely did not plan

to practice optometry, and one indicated that he had not made up his mind.

The answers to question No. 9, indicating whether or not they routinely identified themselves as optometrists in their present occupation, were classified as follows:

Answer	Non-Med.	Med.
Yes	10	7
Yes-and-No	11	3
No	21	4

Question No. 10 could not be answered meaningfully by the medical respondents, but of the 42 non-medical respondents, 29 reported that they do not practice optometry at all, seven do occasional refractions, five practice a few hours each week, and one devotes about half of his time to an optometric practice.

Whether or not the respondents consider themselves as having special or useful qualifications for their present work as a result of their optometric studies is indicated by the following table:

Answer	Non-Med.	Med.
Yes	26	13
Perhaps	5	0
No	11	1

The most valuable courses for their present work is represented in the following table showing: *a*, all courses named, and *b*, only the first course named by each respondent:

Course	Non-Med.		Med.	
	a	b	a	b
Optics	10	9	0	0
Physiological & psychological optics	11	3	3	2
All courses	5	5	3	3
Clinical courses	6	2	3	2
Biological courses	4	3	3	2
Mathematics	4	2	0	0
Physics	5	1	0	0
All science courses	0	0	1	1
Chemistry	2	0	0	0

Whether or not the respondents would consider any or all of their optometric education important if they were preparing themselves anew for their present careers is shown in the following table:

Answer	Non-Med.	Med.
Yes	18	4
Perhaps	6	3
Answer omitted	1	0
No	17	7

Most of the medical "no" answers in the above were qualified by the statement to the effect that the extra years involved in taking optometry first made the total training time too long. The correlation between the answers to questions Nos. 11 and 13 was very low in the medical group, and very high in the non-medical group.

The following table reflects the respondents' opinions as to whether there is need or opportunity for more optometry graduates in their type of work:

Answer	Non-Med.	Med.
Yes	17	5
Perhaps	5	2
Answer omitted	0	2
No	20	5

Several very emphatic "yes" answers were given by respondents in optical engineering, manufacturing, and sales.

On the question of membership in optometric organizations, the greatest significance appeared to be in the number of organizations with which they identified themselves. Only two listed the American Optometric Association but many listed local and special optometric organizations or fraternities, as follows:

No. of organizations	Non-Med.	Med.
0	23	10
1	9	2
2	3	0
3	6	2
4	1	0

Question No. 16 was answered in many ways, those favoring a "broadening" of the curriculum usually suggesting isolated areas in which greater emphasis should be placed. The suggested areas showed no consistency except in reflecting the needs of their particular occupations. The following table indicates their expressed attitudes, but does not deflect any common view as to the direction the broadening should take.

Answer	Non-Med.	Med.
Yes	16	2
Perhaps	2	0
Answer omitted	4	1
No	20	11

The questionnaire did not include a specific inquiry as to the eventual plans of the respondents, but the volunteered comments and the mode of answering several of the questions often indicated their plans. In the case of the medical respondents this aspect was of course

uninterpretable except in the sense that six of the seven in medical practice were doing refracting routinely, and most of the six medical students indicated plans to enter ophthalmology. Of the 42 non-medical respondents, eight definitely expected to return to the practice of optometry as a career, six suggested the probability of doing so, six expected not to do so, and 23 gave no indications one way or another.

DISCUSSION

The statistical evaluation of the replies is of course very limited, not only because of the highly restricted sample, but also because of the difficulty in obtaining reasonably representative examples from alumni lists, lack of relevant information in alumni files, and differences in interpretations of what constituted "careers other than the clinical practice of optometry." For example, one school appeared to have a very complete file of graduates who subsequently earned M.D. degrees while at least two schools apparently excluded this category by interpreting ophthalmological practice as an expansion of optometric practice. Likewise, depending on the age and acquaintanceship of the person who perused the alumni files, some schools included mostly early graduates and some included mostly recent graduates.

Aside from these statistical summaries, however, there were some inferences to be drawn from the character of the replies, since there was more than adequate space in the questionnaire to permit and encourage the entry of details and comments. In particular the author was pleasantly surprised by the frequency of expressions of enthusiasm and gratitude for their optometric education, particularly in view of the natural presumption that this group would include a large share of dissatisfied graduates. As a further test of the validity of this optimism the author circulated the replies in a group of about 12 optometry school representatives in a private gathering and noted their reactions. The reactions almost unanimously confirmed the author's own. Further, because almost every respondent was personally known by at least one person in attendance at the private gathering, it was possible to establish that the individual replies reflected quite accurately the attitudes that would have been attributed to the individual respondents.

Several of the respondents expressed emphatic appreciation for the recognition afforded them by the questionnaire and for the opportunity to give their views. One of the respondents suggested the possibility of establishing an organization in the interest of this group, and requested the names and addresses of the respondents so that he could contact them in this connection. Another respondent made a personal

visit to the author to point out the need for more optometrists in the research organization with which he was affiliated, as a result of which an information bulletin was sent to all of the schools.

The fact that approximately half of the respondents did not routinely identify themselves as optometrists in their work reflected with few exceptions the fact that their occupations did not provide the natural occasion to do so. A remarkable number of the same group identified themselves with various optometric organizations and virtually all have continued to maintain their optometric licenses.

That the general calibre of the group is high was indicated by the character of their replies, by the above average number of licenses held, by the number of additional degrees earned, and the number and type of optometric organizations with which they identified themselves. Many of those giving financial difficulty or necessity as a reason for their departure from the practice of optometry pointed out that they chose their present occupation in preference to the commercial practice of optometry. Only one expressed an attitude of bitterness about his original choice of optometry.

HEARING AID SPECTACLES AND OPTOMETRISTS*

Carel C. Koch†
Minneapolis, Minnesota

Should optometrists consider prescribing hearing aid spectacles? The following are the writer's ideas only, and are presented because of recent new developments in the field of prescribing these aids to hearing. It is claimed that four per cent of all persons over 45 have a hearing problem aids will assist. Most of these same individuals are ametropic. It is also known that the body worn hearing aid is on the way out and the attachment to a spectacle frame is fast becoming the accepted solution.

Minneapolis is the center of hearing aid manufacturing business. Company executives are predicting that the industry as a whole will produce a million hearing aids during 1958, and that more than half of them will be attached in some way to spectacle frames. Somewhat dis-

*A synopsis of a news report of February 10, 1958, to the Executive Council of the American Academy of Optometry, from the author. For publication in the March, 1958, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

†Optometrist. Fellow, American Academy of Optometry.

counting this figure still leaves an impressive total of spectacles with a hearing aid attachment.

A review of current literature in the hearing aid field shows that a large number of "specialty men" who have been in the hearing aid business for years have opened optical dispensing departments as part of their regular service. In other words, they are now hearing aid dealers and dispensing opticians. It is also known that many established dispensing opticians are now dispensing hearing aids as well as spectacles.

From an authoritative source in the hearing aid industry it is claimed that a substantial number of hearing aid distributors (between 400 and 600) will probably become dispensing opticians before the end of the year. Adding this new group to the dispensing opticians already in the field means more vigorous competition for optical dispensing business.

As most optometrists at present do not engage in prescribing hearing aid spectacles, they are left out of this new development and many of their patients who want these devices will be forced into the hands of dispensing opticians some of whom will do everything possible to wean the patients away from optometry.

* * * * *

Over the years, because of ethical concepts of practice, optometrists have permitted a very large portion of the regular dispensing of opthalmic materials to slip through their fingers. Much of this was done by them deliberately, as it was felt that there was some stigma attached to filling a prescription that did not originate in one's own office. In doing this, the financial position of the dispensing optician was naturally strenghthened. Somewhat the same thing happened to the distribution of plano sun glasses.

Some years later the entire field of contact lens fitting was opened to optometrists. Again conservatism and complacency on the part of most optometrists caused them to ignore these new aids to vision, and again a very substantial segment of the work done in this specialty was siphoned off by technicians.

Three years ago the hearing aid spectacle first made its appearance. Again optometrists showed little interest, feeling that it was for the most part a passing fad of no major significance. Again the profession is faced with having a large number of patients diverted away from optometry because of its reluctance to assert itself and to supply the fullest possible service to the spectacle wearing public it serves.

How long can optometry afford to passively stand by and see technicians make off with substantial blocks of patients who should be

properly and adequately served by optometrists? No other professional group condones this sort of thing.

* * * * *

The hearing aid literature also now indicates that "specialty men" in the hearing aid field are preparing Bills to submit to State Legislatures in 1959 to authorize them to serve the public as hearing experts and to prohibit others from fitting hearing aids, thus limiting the field to themselves.

If untrained health personnel can learn to prescribe hearing aids certainly an optometrist with undergraduate professional training in the physiology and anatomy of the head and neck can be so trained. In fact many are now doing this with success, although we understand they are perhaps running counter to present day optometric professional viewpoints as they do this work. If the competitive pressures from technicians force optometrists to enter this field they must do so only after proper post-graduate training and with the cooperation of physicians and otologists in their immediate areas.

As improperly adjusted hearing aids attached to temples will alter the position of patients' lenses, optometrists are justified in the interest they take in making sure that the combined unit is serving the patient properly. Optometrists who are already experts in prescribing for visual problems could when requested by patients, also extend their services to prescribing hearing aids attached to spectacles where these are essential.

It would not be necessary for optometrists to become franchised dealers in hearing aid products. No stocks of materials would be required. Nor, would it be necessary for optometrists to engage in unprofessional or unethical practices. Hearing aids attached to spectacle frames may be prescribed by optometrists just as lenses are prescribed. The optometrist's nearby laboratory can fill the prescription and return the completed materials (frame, lenses and hearing aid attachment) to the optometrist for dispensing. Plans are now underway to make this possible through leading laboratories now serving the profession.

* * * * *

As has been indicated, a new practice potential for hearing aids of the spectacle type is now developing. Seventy per cent of the prescriptions for such "sight-and-sound" spectacles are made to patients who have never before worn a hearing aid. A considerable segment of patients passing through the average optometrist's or ophthalmologist's office represents those with a measurable hearing loss. The patients need and will order a device that improves their hearing, particularly if it is

comfortable and inconspicuous. It is claimed that the optometrist or ophthalmologist who does not today prescribe hearing spectacles is passing up an opportunity to render a needed and valued service to his patients.

To meet this special need for optometrists and ophthalmologists, a newly formed company offers hearing spectacles designed exclusively for professional distribution.* Theirs is an adjustable device that will appeal particularly to professional men.

Users—both present and potential—of hearing aids are beginning to look to professional men for help. In some measure, the distribution pattern for hearing aids is following the transitional stages that marked early development of opticianry many years ago. With the advent of hearing aids combined with spectacles, potential buyers, naturally, are beginning to look to the source where they secured their visual service. These patients feel that the new hearing spectacles fall into the category of the optometrist and ophthalmologist rather than that of the "specialty" man.

This new suggested service tailors its products especially for professional use on the part of physicians and optometrists. It is claimed that the aids will not be sold through dealer outlets. The writer believes this new idea is bound to be copied by a number of manufacturers and laboratories.

* * * * *

A new opportunity for optometrists to present a more complete service is now developing. This service is especially made for professional men and takes into consideration the limitations and ethical concepts of optometric practice. In all parts of the country, during the year, the service will be made available to the profession by laboratories now serving optometrists. The complete idea, while new, will be found to not only enlarge the service of the optometrist for his patients, but will also enable him to retain them and enhance his income. The writer believes a large number of optometrists will appreciate the opportunity this new plan affords and will make the most of it in the best interest of their patients.

*Prescription Hearing Aid Company, 1316 Yale Place, Minneapolis

INSTRUMENT REVIEW

MULTIPLE TARGET SCREENER

Rapid visual field studies in glaucoma detection are now possible with the Multiple Target Screener, manufactured by the Roberts Instrument Company, 515 West Reed St., Moberly, Missouri. These screening tests should be run on all presbyopic patients. The Multiple Target Screener utilizes the principle of the tachistascope to flash a series of strategically located dots before the fixating eye. The instrument uses ultra-violet radiation to activate fluorescent targets so that it may be operated under normal lighting conditions. The technique of operation is simple and requires but three to five minutes for each patient. The July, 1957, issue of INDUSTRIAL MEDICINE AND SURGERY points out that the multiple pattern of visual field examination has proved satisfactory for early detection of glaucoma. Reports from examiners using this sort of test in industry indicate the referral rate is from two to four per cent. The cost of the new Multiple Target Screener is $87.

CURRENT COMMENTS

Terry Judith Parkins
Editorial Assistant

Optometrists will confer a favor by sending news items of general interest for this department: such as relate to new instruments, clinical techniques, education, visual health and optometric legislation and organization.

A.O.A. TO MEET IN WASHINGTON, D. C., IN JUNE

The 61st annual meeting of the American Optometric Association will be held in Washington, D. C., June 25-28, 1958. The headquarters hotel will be the Shoreham. Dr. Gabriel Ross, Washington, is in charge of arrangements. The educational program will consist of four 8-hour courses, each of which will be repeated twice during the convention. These courses of post-graduate instruction are as follows:

Course I. *Contact Lenses.* Instructor, Neal J. Bailey, O.D., Ph.D., assistant professor, Division of Optometry, Indiana University, Bloomington, Indiana.

Course II. *Optometric Economics.* Instructor, Frederick Kushner, O.D., Sheldon, Iowa.

Course III. *Styling, Dispensing and Adapting Eyewear.* Instructors, Marguerite Dowaliby, O.D., and Pauline Dowaliby, O.D., El Segundo, California.

Course IV. *Subnormal Vision Aids.* Instructors, Vincent J. Ellerbrook, O.D., Ph.D., professor, School of Optometry, The Ohio State University, Columbus, and Alfred Rosenbloon, O.D., M.Sc., dean, Illinois College of Optometry, Chicago.

NEWS FROM SUPPLIERS

New York City. The Better Vision Institute announces that the Ward Optical Manufacturing Corporation, North Arlington, New Jersey, has joined the Institute.

Newark. The Liberty Optical Manufacturing Company's "Ad-Libs" are now being sent to a large list of optometrists and laboratories. These mailings deal with Liberty products and if you are not receiving these bi-monthly releases write to Albert A. Kohler Company, Lockwood Building, Old Greenwich, Connecticut, and they will put your name on their mailing list.

Dayton. The Research Division of the Univis Lens Company has announced the distribution of the new Univis Professional Visual Demonstrator Kit. Price $10. This patented kit consists of three intermediate and near testing units in a leatherlux case: a graphic demonstrator brochure, with transparent overlapping drawings that provide visual explanation to the patient of the basic needs and visual range functions of the eye, and the new Univis Vocational Test Chart for subjective near-point testing at 13, 16, 20, 24 and 27 inches.

Petersburg, Va. The Titmus Optical Company has been celebrating their 50th birthday. The sales force presented the founder of the company, Mr. E. H. Titmus, with a 16-inch gold Chippendale tray especially engraved for the occasion, and the 1,300 employees of the plant presented him with a 19"x26" bronze relief portrait plaque of himself in honor of the anniversary.

Rochester, N. Y. We wonder how many optometrists have had the opportunity of looking over the "Plan for Guaranteed Growth" program and the "Here's How Bulletins" that are being shown by Bausch & Lomb sales people. This material is a must—and if you have not had a chance to study these reports, drop them a line and one of their men will call. They will not be sent by mail. The idea is built around the multiple needs of each patient and is so essential that every optometrist should take it to heart. Mr. M. C. Williamson (B. & L. advertising director and his staff) has done a beautiful job on this and when applied will spell success for any practitioner. Bausch & Lomb also reports that their Orthogon range of lenses has been extended to include lenses up to 15.25 D., including sphero-cylinders.

Geneva, N. Y. Shuron Optical Company reports on three new

items: (1) a new Screw File Repair Kit containing replacements for most screws, hexnuts, lock screws and washers used today in spectacle frames along with files, taps, etc., all packaged in a nice case: (2) a new spectacle case bar, showing 18 of the newest Shuron cases, and (3) a new man's spectacle frame, medium weight zylonite, called Rondean Shelltex. They also report that 13 million Browline frames have been sold in the last 10 years.

Southbridge, Mass. The American Optical Company reports that 12 separate traveling units, each displaying the complete AO frame line are now on the road. Officials estimate that these displays will be seen in each of the company's more than 250 branch cities during the next 60 days. When shown, all optometrists in each area are invited to see this display. The American Optical Company also announce the distribution of new frame sample boxes for display use, in office dispensing rooms.

DICTIONARY OF VISUAL SCIENCE

The *Dictionary of Visual Science* which has been in preparation for the past ten years is now nearing completion and should be published during 1958. This new work will contain 13,000 listings pertaining to all phases of vision. The book will be illustrated and will include pronunciations. The Chilton Company, Philadelphia, will publish the volume. The editors are Max Schapero, O.D., and David Cline, O.D., of Los Angeles, and Henry W. Hofstetter, O.D., Ph.D., Bloomington, Indiana.

GIFTS TO INDIANA, DIVISION OF OPTOMETRY

The Women's Auxiliary of the Indiana Optometric Association contributed $1,000.00 to Indiana University to create a student loan fund for optometry students. Established as a permanent fund in the name of the Auxiliary, it may be added to by further contributions and will be administered by the Indiana University Student Loan Office. Applications for loans are already being processed.

The Continental Optical Company, Indianapolis, added $675.00 to the Indiana University fund for a graduate research fellowship in physiological optics established in the name of the company in 1955. The present appointee to the fellowship is Tully C. Patrowicz, O.D., a graduate of Southern College of Optometry, who is scheduled to complete his M.S. degree in physiological optics this semester. He plans to continue his work toward the Ph.D. degree. The previous appointee was Wm. Baldwin, O.D., a graduate of Pacific University, College of Optometry, who completed his M.S. degree in physiological optics in 1956 and is presently working toward his Ph.D. degree as an American Optometric Foundation Research Fellow.

NEWS BRIEFS

Twenty-two optometrists have just completed a three-day post-graduate course in contact lens fitting given by the Contact Lens Foundation at Philadelphia. The instructor was Harold I. Moss, O.D., 2106 Baynard Blvd., Wilmington, Delaware. The enrollment was limited to optometrists and the fitting of all forms of contact lenses was stressed during the instruction period. Similar courses are planned in other parts of the country and optometrists may secure additional information by writing Dr. Moss. . . . A Bill providing for the registration of optometrists and dispensing opticians and for the professional regulation of both groups in Great Britain has passed its second reading in Parliament. . . . At the December, Indianapolis meeting of the American Association for the Advancement of Science, Dr. Sylvester K. Guth, manager, Radiant Energy Effects Laboratory, General Electric Company, Cleveland, pointed out in a convention address, that seeing is a dynamic activity of human beings. To provide the best seeing conditions, light and lighting must fulfill at least three basic objectives, these being (1) to provide sufficient light on the task so the worker can see what he is supposed to see and perform the task in terms of certain standards of speed and accuracy; (2) to provide a level of illumination which permits a worker to perform his task with minimum effort, and (3) to provide a brightness balance within the visual environment that will not detract from ability to see or will not produce discomfort. . . . Following an analysis of old and new type faces, Dr. Louis Anapolle, Boston, advised THE BOSTON HERALD-TRAVELER to use Spartan Book Type as an improvement in legibility for use in their daily papers. The publishers adopted his recommendations on January 21, 1958, and praised his work with a page one story. . . . The second London Course of Optometry will be given April 1 through May 2, 1958, at the Rotary House, London. The instructors are members of the British Chapter, American Academy of Optometry, and the course reviews all aspects of refractive work and contact lens fitting. Optometrists from the North American continent are welcome to attend and may secure a brochure reviewing this important post-graduate activity from the editor of this publication, or by writng to Mr. C. S. Flick, 19 Chilworth Mews, London, W.2, England. . . . Dr. Robert E. Bannon, formerly of the Bureau of Visual Science, American Optical Company, Southbridge, Massachusetts, is now associated with the Instrument Division, American Optical Company, Buffalo, New York. Dr. Bannon will continue his work as secretary of the Aniseikonic Forum at Buffalo.

BOOK REVIEWS

THE GLAUCOMAS. H. Paul Sugar, M.D. Published by Hoeber-Harper, 49 E. 33rd Street, New York City. Second Edition. 516 pages. 164 illustrations. Cloth. $13.50. 1957.

This book is a second enlarged edition of the well known text by Dr. Sugar. The changes made are designed to bring the previously presented material up to date. The author has collected a great volume of material on the many faceted aspects of that group of conditions defined as the glaucomas. The book is well documented and offers an excellent review of the problem. It makes relatively minor demands upon the background of the practitioner and is recommended to the visual practitioner seeking broader knowledge of the subject.

The degree of emphasis may be gleaned from the following rather crude breakdown of the aproximately five hundred page content of the book:

		Pages
1.	Introduction and background information	70
2.	Tests for the glaucomas	110
3.	Classification, Symptomatology and Diagnosis	150
4.	Treatment and Surgery	150
5.	Clinic and Screening Techniques	20

An entire chapter is devoted to a discussion of tonography. Tonography is a measure of the facillity of outflow of aqueous. Interference with the flow of aqueous leads to increased intraocular pressure, and thus, to glaucoma. Hence, the importance of this development may be readily seen. Similarly, considerable discussion concerning the use of the new drug, Diamox, and other developments has been included.

As in the case of virtually every text, this one, too, has its weaknesses. However, by and large, it is an excellent contribution in this most important area.

JAY M. ENOCH, O.D., PH.D.

SCHOOL OF OPTOMETRY
THE OHIO STATE UNIVERSITY
COLUMBUS, OHIO

PRINCIPLES OF OPHTHALMOSCOPY. John K. Erbaugh, M.D. Published by Charles C. Thomas, Springfield, Illinois. 70 pages. Illustrated. $4.50. 1957.

Here is a small book presenting the essentials of ophthalmoscopy in the order in which one might go about making an examination of the eyes with the ophthalmoscope. It opens with a chapter on opacities,

then turns to the normal and the common pathological conditions detected at the optic disc. Functional, organic and combined changes follow and the final chapter relates to retinopathies. There is an appendix, a short list of selected readings and a correspondingly short index. However, the book is full of good colored illustrations, plenty of diagrams and a good deal of discussion. It appears to have been the intent of the author to present the subject in a practical way which would give the reader both a verbal and visual picture of the conditions discussed.

This unobstrusive, but useful book, might well find its place on the eye doctor's desk or lens cabinet so as to be at hand for quick reference during examination or consultation. It might slip into the white coat pocket. This reviewer feels it may have more immediate practical use for the busy practitioner than more cumbersome works, which are often not suitable for quick reference during office hours.

T. H. EAMES, M.D.

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THE EFFECT ON BINOCULAR VISION OF VARIATIONS IN THE RELATIVE SIZES AND LEVELS OF ILLUMINATION OF THE OCULAR IMAGES. H. F. Gillot. Published by the British Optical Association, 65 Brook Street, London, W. 1., England. 82 pages. Illustrated. $2.50. 1957.

The first part of this comprehensive report on research conducted in the Department of Applied Optics at Manchester College of Technology reviews the historical and preliminary work: experiments with a specially-constructed direct comparison type of eikonometer and with a space eikonometer, constructed similar to Ames' original model, which was found to give highly reliable measurements.

Data on the accuracy and repeatability of the measurements obtained from the space eikonometer are presented and discussed together with other details (refraction, etc.) resulting from the visual examinations of the 100 subjects studied. Conclusions from the analysis of results are summarized as follows:

1. In 42% of the subjects, space eikonometer measurements revealed an aniseikonia greater than 0.8% in amount.
2. 7% showed aniseikonia greater than 3% in amount.
3. 8% were considered to have a significant aniseikonia associated with ocular symptoms.
4. Aniseikonia was most commonly found associated with

anisometropia: 60% of the anisometropes had aniseikonia greater than 0.8% in some meridian, usually related to the inequality between the correcting lenses: aniseikonia over 0.8% was present in 40% of the emmetropes: the incidence of aniseikonia was the lowest in the isometropic subjects.

5. Normal binocular vision was not found in subjects who had an aniseikonia greater than 3%. Ocular symptoms in these subjects included suppression, binocular instability, frontal headaches and asthenopia.

6. The incidence of aniseikonia, together with binocular instability, suggests that more consideration might be given to this factor in the etiology of strabismus.

7. The space eikonometer could be a valuable addition to orthoptic instrumentation because it would detect an image size difference that might be an obstacle to the development of binocular stability by means of exercises.

8. It was concluded from the experiments that very accurate determinations of image size difference could be made with the space eikonometer. The average subject showed a sensitivity of $\pm 0.2\%$ and a good observer was usually sensitive to change of $\pm 0.1\%$. Sensitivities of this order were found in young children who are not expected normally to give reliable results in subjective tests.

9. From the results of the examination of subjects showing the higher degrees of anisometropia, it seems that the only satisfactory way of dealing with this type of error in practice entails making aniseikonic measurements. If no aniseikonia is found, the full refractive correction may be prescribed with confidence. When a significant aniseikonia is found, the incorporation of suitable magnification in the prescription will allow the patient to have the best visual acuity and eliminate the necessity of prescribing reduced corrections.

10. Investigations using a moving rod depth perception test to measure aniseikonia in the horizontal meridian indicated that size errors could be estimated within $\pm 0.4\%$ by this method for an observer of average stereoscopic capabilities.

The latter part of the report is concerned with the effects on subjective visual space induced by variations in the relative intensities of retinal illumination. The construction and calibration of a variable density filter are described. Data resulting from space eikonometer measurements and longitudinal horopter determinations under conditions of unequal retinal illumination agreed closely and are discussed in connection with "irradiation aniseikonia" and the Pulfrich phenomenon.

Everyone interested in aniseikonia and in binocular vision will profit by reading Gillott's excellent contribution.

ROBERT E. BANNON, O.D.

AMERICAN OPTICAL COMPANY
INSTRUMENT DIVISION
BUFFALO 15, NEW YORK

I.H.B. OPTICAL AIDS SERVICE SURVEY. Published by the Industrial Home for the Blind. 57 Willoughby St., Brooklyn, New York. 48 pages. 1957.

This small book will be of great interest to all optometrists engaged in fitting subnormal vision aids. It is based upon the first 500 cases served by the Industrial Home for the Blind between March, 1953, and December, 1955. It is well-written, informative, and contains much information not easily obtained elsewhere.

The first section is a description of the Optical Aids Service offered by the Industrial Home for the Blind. This service is a most enlightened one, and the mechanics of the Home might well serve as a pattern for other similar agencies. The interrelationships between agency and various professional workers such as optometrists, ophthalmologists, social workers and others is described and seems to be well worked out, with a harmonious program resulting.

The second section contains data concerning the first 500 cases. These data include the type of acuity present at the time of application, the degree of improvement obtained, the types of aids prescribed, the number of visits it was necessary for clients to make to the center, the relationship of age of the client to degree of benefit from the aids, the underlying abnormality causing the legal blindness of the clients, the length of time the clients had been blind, the uses to which the clients were able to put their aids, and other similar facts.

The third section is a brief review of the devices themselves and the principles upon which these magnifying devices work. The last part of this section is a review of the equipment and space necessary in setting up an optical aids center. This section, while not designed for the optometrist in private practice, will, nonetheless, give him some idea of the equipment necessary for the practice of this optometric specialty.

The staff of the Industrial Home for the Blind and Mr. Peter J. Salmon, executive director, are to be congratulated on the service the Home is offering to the public and on this excellent review of their work. Most optometrists will find it well worth their reading.

MONROE J. HIRSCH, O.D., PH.I

OPTICAL LABORATORY SPECIALIST. Published by the Department of the Army, U.S.A. Technical Manual No. 8-237, D. 101, 11:8-237, Superintendent of Documents, Government Printing Office. Washington 25, D. C. 212 pages. 202 illustrations, 10 tables and a glossary containing 143 definitions. Paper covers. 75c. 1957.

This manual is designed to serve as an appropriate textbook and convenient reference, for personnel undergoing training for optical laboratory specialist and as a reference text for personnel assigned to the Optical Services.

In general, the manual contains technical information of a practical and theoretical nature as applied to the supply aspects of the Army Optical Service. Particular emphasis is placed on all techniques and procedures involved in producing finished spectacles. The manual also outlines practices and procedures for the operation, maintenance, and administration of a military optical laboratory.

The manual also presents certain basic facts of general optics, anatomy of the eye, physiological optics, facial measurements and frame fitting procedures. This elementary hand book should be of interest to optometric educators and students. Optometrists in practice might find it useful as background material for training office assistants.

DONALD A. SPRINGER, O.D.

22 E. TWELFTH STREET
ANNISTON, ALABAMA

THE DOCTOR EYES THE POOR READER. Delwyn G. Schubert, Ph.D. Published by Charles C. Thomas, Springfield, Illinois. 95 pages. 1957.

The relation of vision to the ability to read is such that one is immediately led to suspect poor vision in cases of reading disability. This "a priori" reasoning is apt to lead the optometrist to erroneous conclusions unless he is aware of the complexity of causes of poor reading.

Dr. Schubert, a professional educator, has foreseen the tendency of the specialist to relate reading problems in the light of his own specialty. He has written this book to broaden the specialist's conception of the cause of reading problems and to guide him in the disposal of such cases.

The book is divided into five chapters. The first chapter deals with the importance of reading and touches on individual differences in reading ability. Chapter two discusses the various causes of reading failures. Chapter three covers the role of the medical specialist.

Chapter four was written by an optometrist, Dr. Carl C. Cowin, and was reviewed by an ophthalmologist, Dr. Thomas M. Eby. In it are to be found (1) The Gertrude Knox list of observable symptoms of visual difficulty; (2) screening tests requiring minimum equipment; (3) screening tests with instruments; (4) the use of visual training, lenses and surgery.

Chapter five is devoted to the methods used by teachers and reading specialists to help poor readers. Chapter six is directed to the reader and is intended to guide him in the improvement of his own reading skills.

This book is not intended to be an exhaustive study of the problem of reading failure but is an introduction to the subject. If any one word could be used to describe this book it would be "Digest," for the author has succeeded in condensing into a few pages the essential information which health practitioners should know in order to answer questions and to counsel parents on the subject.

The author mentions that the text is directed primarily to medical specialists but it is of interest also to optometrists, educators and parents. Any optometrist who has kept himself abreast of current optometric literature on this subject will not learn much that is new to him with the exception perhaps of the material in chapter five. Most of the references will also be found in optometric literature.

This reviewer does not hesitate to recommend this book to optometrists on three counts: (1) It is the best introductory text on the subject for those seeking information or for review purposes. (2) Its concise non-technical language makes it an ideal book for lending to parents of poor readers so that they may understand more fully the complexity of reading and not suffer too great a disappointment should visual care not remedy their child's problem. (3) We can profit from the advice of this author on how to improve reading ability.

MAURICE BELANGER, O.D.

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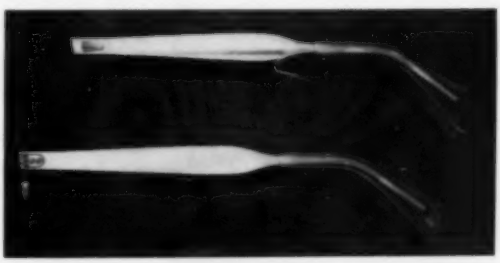
OPTICAL FASHIONS IN THE NEWS

New Color, Trim and Temples Make Mansfram and Ladysfram the Last Word in Eyewear Fashion

Two strong and handsome new colors broaden the popular Mansfram's appeal to men. **Burnt Ash**, a smoky brown with black and gray stratas, can be worn equally well with blacks, charcoals, grays and browns. **Mahogany Briar** is a rich and masculine briar brown, livened with translucent bands of mahogany reds. Mansfram's seven colors and six temples, plus Tempeloc and Barreloc, give you a choice for every taste.

Ladysfram, dressed in conservative No. 23 Antique Endpiece Trim, is captivating new ranks of women. A tailored type of trim, 1/10 12K gold filled, the No. 23 is smart and elegant rather than sparkling and flashy. Looks well with the new Lurium temples or, as shown, with the No. 63 Deluxe temple. Choice of antique brown on mello, or antique blue or ebony on white.

New No. 62 all-Lurium Temple is pictured above on Mansfram. No. 65 Lurium Temple has crystal tips. Front and back views shown at right. Hinge countersunk in side for extra security and good looks. Equipped with new Tempeloc hinge pins as well as screws.



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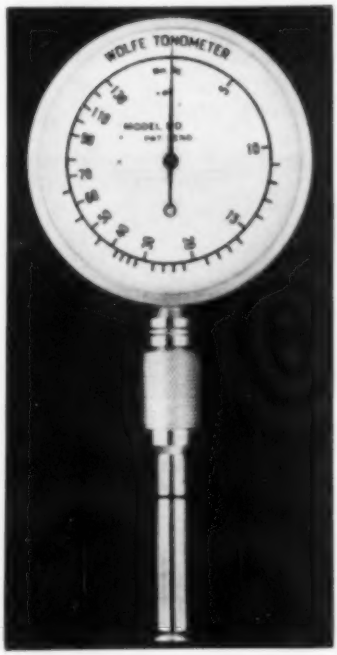

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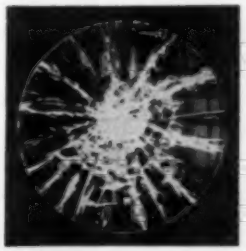

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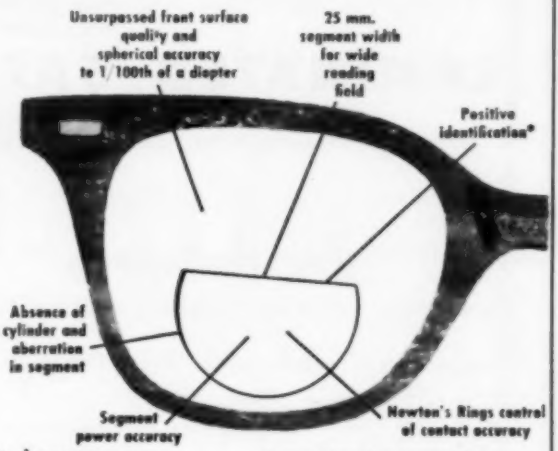
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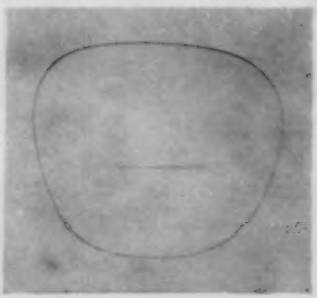

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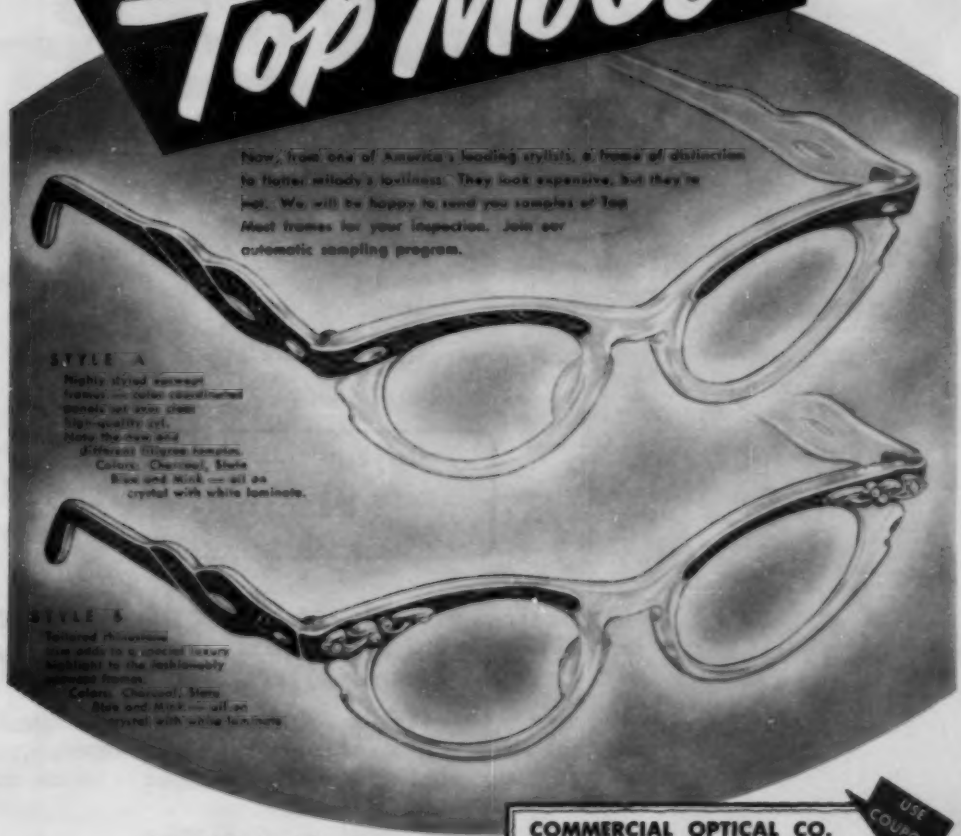
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